Republic of Iraq - Ministry of Higher Education and Scientific Research

AL Iraqia University

Bachelor's degree in Network AND Cyber Security Engineering (First cycle)

Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25 hr

Program Curriculum (2024- 2025)

جمهورية العراق - وزارة التعليم العالي والبحث العلمي

الجامعة العراقية

بكالوريوس في هندسة الشبكات والأمن السيبراني(الدورة الأولى)

أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة اوربية - كل وحدة اوربية = ٢٥ ساعة

المنهاج الدراسي للعام 2024- 2025

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	One	1	MATH 1101	Mathematics I	الرياضيات 1	English	4						3	63	62	125	5.00	B	
		2	ELCA 1102	Electrical Circuit Analysis I	تحليل الدوائر الكهربائية 1	English	2		2		1		3	78	47	125	5.00	C	
		3	LOCD 1103	Logic Circuit Design	تصميم الدوائر المنطقية	English	2		2		1		3	78	47	125	5.00	C	
		4	EDR 122	Engineering Drawing	الرسم الهندسي	English	1		3				3	63	37	100	4.00	B	
		5	PHYS 1105	Physics	الفيزياء	English	2						3	33	67	100	4.00	B	
		6	ENLA102	English Language	اللغة الانجليزية	English	2						3	33	17	50	2.00	S	
		7	HRAD103	Human Rights	حقوق الانسان	Arabic	2						3	33	17	50	2.00	S	
		8	CHEM 1108	Chemistry	الكيمياء	English	2						3	33	42	75	3.00	B	
						Total	17	0	7	0	2	0	24	414	336	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGI	Two	1	MATH 1201	Mathematics II	الرياضيات 2	English	4						3	63	37	100	4.00	B	MATH 1101
		2	ELCA 1202	Electrical Circuit Analysis II	تحليل الدوائر الكهربائية 2	English	2		2				3	63	37	100	4.00	C	ELCA 1102
		3	DISD 1203	Digital System Design	تصميم الأنظمة الرقمية	English	2		2				3	63	37	100	4.00	C	LOCD 1103
		4	TEWO 1204	Technical Workshop	الورشة الفنية	English	1		2				3	48	27	75	4.00	B	
		5	ELCD 1205	Electronic Circuit Design	تصميم الدوائر الالكترونية	English	2		2				3	63	37	100	4.00	C	
		6	COPR 1206	Computer Programming I	برمجة الحاسوب 1	English	4		2				3	93	57	175	6.00	C	
		7	ARLA101	Arabic Language	اللغة العربية	Arabic	2						3	33	17	50	2.00	S	
		8	BIOL 1208	Biology	الأحياء	English	2						3	33	17	50	2.00	B	
						Total	19	0	10	0	0	0	24	459	266	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Three	1	MATH 2101	Mathematics III	الرياضيات 3	English	4						3	63	37	100	4.00	B	MATH 1201
		2	DIEL 2102	Digital Electronic	الالكترونيك الرقمي	English	4		2				4	94	56	150	6.00	C	DISD 1203
		3	FOCS 2103	Fundamentals of Cybersecurity	أساسيات الأمن السيبراني	English	4						3	63	37	100	4.00	C	
		4	OBOP 2104	Object Oriented Programming OOP	البرمجة الشيئية الموجهة	English	2		2		1		4	79	71	150	6.00	C	COPR 1205
		5	COMM 2105	Communication I	الاتصالات 1	English	2		2				4	64	36	100	4.00	C	
		6	NMSA 2106	Applied Numerical Methods and Statistical Analysis for Engineers	الأساليب العددية التطبيقية والتحليل الإحصائي للمهندسين	English	4							60	40	100	4.00	B	
		7	CBRI104	Crimes of the Baath Refime in Iraq	جرائم البعث	Arabic	2						3	33	17	50	2.00	S	
						Total	22	0	6	0	1	0	21	456	294	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGII	Four	1	MATH 2201	Mathematics IV	الرياضيات 4	English	4						3	63	37	100	4.00	B	MATH 2101
		2	COMM 2202	Communication II	الاتصالات 2	English	2		2				4	64	36	100	4.00	C	COMM 2105
		3	DASY 2203	Database Systems	أنظمة قواعد البيانات	English	4		2				4	94	56	150	6.00	C	
		4	CONE 2204	Computer Network I	شبكات الحاسوب 1	English	2		2				4	64	36	100	4.00	C	
		5	PPCS 2205	Python Programming in Cyber security	برمجة البايثون في الأمن السيبراني	English	2		2				4	64	36	100	4.00	C	COPR 1205
		6	OPSA 2206	Operating Systems and Applications	انظمة التشغيل وتطبيقاتها	English	4						3	63	37	100	4.00	B	
		7	ARLA201	Arabic Language	اللغة العربية	Arabic	2						3	33	17	50	2.00	B	ARLA 1206
		8	ENLA 202	English Language	اللغة الانجليزية	English	2						3	33	17	50	2.00	B	ENLA 1106
						Total	22	0	8	0	0	0	28	412	272	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Five	1	ADMA 3101	Advance Mathematics I	الرياضيات المتقدمة 1	English	4						3	63	62	125	5.00	B	MATH 2201
		2	CAMI 3102	Computer Architecture & Microprocessor	معمارية الحاسبة والمعالجات الدقيقة	English	4		2				4	94	56	150	6.00	C	COAR 2103
		3	OPCO 3103	Optical Communication	الإتصالات الضوئية	English	2		2				4	64	61	125	5.00	C	COMM 2202
		4	DISP 3104	Digital Signal Processing	معالجة الإشارة الرقمية	English	4						3	63	37	100	4.00	C	
		5	CYMA 3105	Cybersecurity management : compliance and convenience	إدارة الأمن السيبراني	English	4		2				4	94	81	175	7.00	B	

		6	CCCL 3106	Cybercrime and Cyber law	الجرائم السيبرانية والقانون السيبراني	English	3						3	48	27	75	3.00	C		
					Total		21	0	6	0	0	0	21	426	324	750	30.00			

UGIII	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Six	1	ADMA 3201	Advance Mathematics ||	الرياضيات المتقدمة 2	English	4						3	63	62	125	5.00	B	ADMA 3101
		2	CRNS 3202	Cryptography and Network Security	التشفير وأمن الشبكات	English	2		2		1		4	79	71	150	6.00	C	DISP 3104
		3	COEN 3203	Control Engineering	هندسة السيطرة	English	2						4	34	66	100	4.00	C	ADMA 3101
		4	SOEA 3204	Social Engineering Attack	هجوم الهندسة الاجتماعية	English	2		2				4	64	61	125	5.00	C	CCCL 3106
		5	NEOS 3205	Network Operating System	شبكات انظمة التشغيل	English	2		2				4	64	61	125	4.00	C	
		6	CONE 3206	Computer Network ||	شبكات الحاسوب 2	English	2		2				4	64	61	125	4.00	C	CONE 2204
		7	VAPT2207	Vulnerability assessment and penetration testing (VAPT)	تقييم نقاط الضعف و اختبار الاختراق (VAPT)	English	2						3	33	17	50	2.00	C	
					Total		16	0	8	0	1	0	26	368	399	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGIV	Seven	1	NEPS 4101	Networks Protocols security	أمن بروتوكولات الشبكات	English	4		2		1		4	109	91	200	8.00	C	CONE 3206
		2	INAD 4102	Infrastructure Attack and Defence	هجوم البنية التحتية والدفاع	English	2		2				3	63	37	100	4.00	C	SOEA 3204
		3	MOCO 4103	Mobile Communication	الإتصالات المتنقلة	English	2				1		3	48	52	100	4.00	C	DICO 3104
		4	ETHA 4104	Ethical Hacking	القرصنة الأخلاقية	English	2		2				4	64	86	150	6.00	C	
		5	GPRM 4105	Graduation Project and Research Methodology	مشروع التخرج ومنهجية البحوث	English	2						3	33	67	100	4.00	C	Level 3 Pass
		6	SOEN 4106	Software Engineering	هندسة البرمجيات	English	2				1		3	48	52	100	4.00	B	
					Total		14	0	6	0	3	0	20	365	385	750	30.0		

	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UGIV	Eight	1	SOCO 4201	Soft Computing	الحوسبة اللينة	English	4		2				4	94	56	150	6.00	C	MALE 4104
		2	WISN 4202	Wireless Sensor Network Security	أمن شبكة المستشعرات اللاسلكية	English	2		2				4	64	86	150	6.00	C	NEPS 4101
		3	NESE 4203	Network Security	امنية الشبكات	English	2						3	33	67	100	4.00	C	
		4	OPNE 4204	Optical Network Security	امنية الشبكات الضوئية	English	2		2				4	64	86	150	6.00	C	OPCO 3103
		5	CLCO 4205	Cloud Computing Security	امنية الحوسبة السحابية	English	2		2				4	64	36	100	4.00	C	
		6	GPRM 4206	Graduation Project and Research Methodology	مشروع التخرج ومنهجية البحوث	English	2						3	33	67	100	4.00	C	GRRM 4105
					Total		14	0	8	0	0	0	22	352	398	750	30.0		
					Total		145	0	59	0	7	0	186	3252	2674	6000	240.0		Must be 240 ECTS

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type		
	CL	Class Lecture
	Lab	Laboratory
	Pr	Practical Training
	Tut	Tutorial
	Lect	Online lecture
	Semn	Seminar

Module type		
	B	Basic learning activities
	C	Core learning activity
	S	Suport or related learning activity
	E	Elective learning activity

SWL:	Student Workload
SSWL:	Structured SWL
USSWL:	Unstructured SWL

Note: Columns O, Q and R are progrmaed, protected and should not be edited

Al-Iraqia University
الجامعة العراقية

First Cycle – bachelor's degree (B.Sc.) – Network Engineering and Cybersecurity

بكالوريوس هندسة - هندسة الشبكات والامن السيبراني



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1. Mission & Vision Statement

Vision Statement

We aspire to be a distinguished scientific edifice, for Arab and international levels, at the forefront of internationally ranked universities. The College of Engineering seeks to be a pioneer among Iraqi and regional universities in the field of scientific research and scientific activity specialized in various technological fields to graduate qualified and skilled engineers who can keep abreast of all developments in the engineering fields and work to fill the country's need for engineering competencies and work to advance the engineering reality to the best its levels**.** In addition, the department is a pioneer among Iraqi universities in the field of network engineering and cybersecurity by preparing qualified engineers who can open new scientific horizons, support the scientific research movement, provide technical advice in the field of specialization, and work to serve the community.

الرؤية:

نطمح إن تكون جامعتنا صرحاً علمياً متميزاً، عربياً وعالمياً، وفي صدارة الجامعات المصنفة عالمياً. وتسعى كلية الهندسة لأن تكون رائدة بين الجامعات العراقية والاقليمية في مجال البحث العلمي والنشاط العلمي المتخصص في المجالات التكنلوجية المختلفة لتخريج مهندسين أكفاء ماهرين لديهم القدرة على مواكبة كل التطورات الحاصلة في المجالات الهندسية للعمل على سد حاجة البلد من الكفاءات الهندسية والعمل على النهوض بالواقع الهندسي إلى أفضل مستوياته.وأن يكون القسم رائدا بين الجامعات العراقية في مجال هندسة الشبكات و الامن السيبراني من خلال قيامه بإعداد مهندسين أكفاء قادرين على فتح أفق علمية جديدة ودعم حركة البحث العلمي وتقديم المشورة الفنية في مجال الاختصاص و العمل على خدمة المجتمع.

Mission Statement

Al-Iraqia University is one of the universities that are concerned with teaching scientific, human, and legal sciences to satisfy the needs of society and provide it with specialists in all fields, and takes care to redouble efforts to collect knowledge and benefit from its abundance in building scientific, cultural and ethical thought, seeks a permanent continuous presence in the field of social activities and the development of internal and administrative systems, including meeting the quality standards and qualifies university, colleges or scientific departments to obtain academic and institutional accreditation. Therefore, our mission is to:

1. Upgrading the educational level to progress and excellence to provide students with everything new and modern through teaching and conducting modern scientific research in engineering specializations.
2. Providing the requirements of distinguished education in network engineering and cybersecurity that is currently available to contribute to the construction process and engineering development and enhance the college's role in the construction process.
3. Raising the scientific and technological level by providing the appropriate environment for students and working on developing their individual and collective skills and abilities in applied engineering fields.
4. Preparing qualified engineers who can meet the needs of the labor market and institutions (public, private**,** and mixed) in the field of network engineering and cybersecurity.

المهمة:

الجامعة العراقية إحدى جامعات العراق التي تعنى بتدريس العلوم العلمية والإنسانية والشرعية لإشباع حاجات المجتمع ورفده بالمتخصصين في جميع المجالات، وتحرص على مضاعفة جهودها لاستيعاب المعرفة والإفادة من فيضها في بناء الفكر العلمي والثقافي والأخلاقي، وتسعى لحضور دائم متواصل في مجال الفعاليات المجتمعية وتطوير النظم الداخلية والإدارية بما يحقق معايير الجودة ويؤهل الجامعة أو الكليات أو الأقسام العلمية لنيل الاعتماد الأكاديمي المؤسسي أو التخصصي**.** لذا كانت مهمتنا هي:

1. الارتقاء بالمستوى التعليمي إلى التقدم والتميز لرفد الطلبة بكل ما هو جديد وعصري من خلال التدريس وإجراء البحوث العلمية الحديثة في مجالات الاختصاصات الهندسية.

2. توفير متطلبات التعليم المتميز في مجال هندسة الشبكات والأمن السيبراني المتوفر حالياً للمساهمة في عملية البناء والتطور الهندسي وتعزيز دور الكلية بشكل خاص في عملية البناء.

3. رفع المستوى العلمي والتكنولوجي من خلال توفير البيئة المناسبة للطلبة والعمل على تطوير مهاراتهم وقدراتهم الفردية والجماعية في المجالات الهندسية التطبيقية.

4. إعداد مهندسين أكفاء قادرين على تلبية احتياجات سوق العمل والمؤسسات (العام والخاص والمختلط) في مجال هندسة الشبكات والامن السيبراني**.**

2. Program Specification

Programme code:	BSc-BIO	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

The Network Engineering and Cybersecurity program consists of 4 compulsory academic years (8 semesters). The program provides basic and advanced knowledge and skills in the fields of networks, protocols, services, modern communications, cybersecurity and related technologies. The specialized courses focused on teaching students the required theoretical aspects in network engineering and cybersecurity. Also, prepare students for practical implementations and gaining the required skills to hold jobs in the local and international market. The program specifications of the specialized subjects are given in more details as following,

1. Networking Fundamentals: The program should cover the foundational concepts of networking, including protocols, network architectures, routing, switching, and network security.

2. Network Design and Implementation: The program should provide knowledge and skills related to designing and implementing network infrastructure, including LANs, WANs, wireless networks, and network security measures.

3. Network Administration: The program should cover network administration tasks such as network monitoring, troubleshooting, performance optimization, and network documentation.

4. Network Security: The program should address network security principles, practices, and technologies, including firewalls, intrusion detection systems, virtual private networks (VPNs), and secure network design.

5. Network Protocols: The program should cover various network protocols such as TCP/IP, Ethernet, DNS, DHCP, SNMP, and others, along with their functions and configurations.

6. Network Virtualization and Cloud Computing: The program should provide an understanding of virtualization technologies, such as virtual LANs (VLANs), virtual machines (VMs), and software-defined networking (SDN), as well as cloud computing concepts and architectures.

7. Network Management and Monitoring: The program should include training on network management tools, network performance monitoring, capacity planning, and network analytics.

8. Emerging Technologies: The program should address emerging trends and technologies in the field of networking, such as Internet of Things (IoT), software-defined networking (SDN), network function virtualization (NFV), and 5G networks.

9. Ethical Hacking: Learning how to identify and exploit vulnerabilities in systems to improve security.
10. Vulnerability Assessment and Management: Identifying, assessing, and mitigating vulnerabilities in systems and networks.
11. Security Risk Management: Understanding and managing risks associated with information systems.
12. Computer Forensics: Investigating digital crimes and analyzing digital evidence.
13. Principles of Network Security: Protecting network infrastructure and ensuring secure communication.
14. Cryptography: Techniques for secure communication and data protection.
15. Incident Response: Responding to and managing cybersecurity incidents effectively.
16. Penetration Testing: Simulating cyberattacks to identify security weaknesses.
17. Security Information and Event Management (SIEM): Using tools to monitor and analyze security events.

مواصفات البرنامج

يتكون برنامج هندسة الشبكات والامن السيبراني من 4 سنوات أكاديمية إلزامية (8 فصول دراسية). يوفر البرنامج المعرفة والمهارات الأساسية والمتقدمة في مجالات الشبكات والبروتوكولات والخدمات والاتصالات الحديثة والامن السيبراني والتقنيات ذات الصلة. ركزت الدورات المتخصصة على تعليم الطلاب الجوانب النظرية المطلوبة في هندسة الشبكات والامن السيبراني. أيضا ، إعداد الطلاب للتطبيقات العملية واكتساب المهارات المطلوبة لشغل وظائف في السوق المحلية والدولية. يتم إعطاء مواصفات البرنامج للمواد المتخصصة بمزيد من التفاصيل على النحو التالي ،

1. أساسيات الشبكات: يجب أن يغطي البرنامج المفاهيم الأساسية لشبكات الكمبيوتر ، بما في ذلك البروتوكولات وبنى الشبكات والتوجيه والتبديل وأمن الشبكة.
2. تصميم الشبكة وتنفيذها: يجب أن يوفر البرنامج المعرفة والمهارات المتعلقة بتصميم وتنفيذ البنية التحتية للشبكة ، بما في ذلك الشبكات المحلية وشبكات **WAN** والشبكات اللاسلكية وإجراءات أمان الشبكة.
3. إدارة الشبكة: يجب أن يغطي البرنامج مهام إدارة الشبكة مثل مراقبة الشبكة ، واستكشاف الأخطاء وإصلاحها ، وتحسين الأداء ، ووثائق الشبكة.
4. أمان الشبكة: يجب أن يتناول البرنامج مبادئ وممارسات وتقنيات أمان الشبكة ، بما في ذلك جدران الحماية وأنظمة كشف التسلل والشبكات الخاصة الافتراضية (**VPN**) وتصميم الشبكة الآمنة.

5. بروتوكولات الشبكة: يجب أن يغطي البرنامج بروتوكولات الشبكة المختلفة مثل **TCP / IP** و **Ethernet** و **DNS** و **DHCP** و **SNMP** وغيرها ، إلى جانب وظائفها وتكويناتها.
6. المحاكاة الافتراضية للشبكة والحوسبة السحابية: يجب أن يوفر البرنامج فهمًا لتقنيات المحاكاة الافتراضية ، مثل الشبكات المحلية الظاهرية (**VLAN**) ، والآلات الافتراضية (**VMs**) ، والشبكات المعرفة بالبرمجيات (**SDN**) ، بالإضافة إلى مفاهيم وهياكل الحوسبة السحابية.
7. إدارة الشبكة ومراقبتها: يجب أن يتضمن البرنامج تدريبًا على أدوات إدارة الشبكة ، ومراقبة أداء الشبكة ، وتخطيط السعة ، وتحليلات الشبكة.
8. التقنيات الناشئة: يجب أن يعالج البرنامج الاتجاهات والتكنولوجيات الناشئة في مجال الشبكات ، مثل إنترنت الأشياء (**IoT**) ، والشبكات المعرفة بالبرمجيات (**SDN**) ، والمحاكاة الافتراضية لوظيفة الشبكة (**NFV**) ، وشبكات الجيل الخامس.
9. القرصنة الأخلاقية: تعلم كيفية تحديد نقاط الضعف في الأنظمة واستغلالها لتحسين الأمان.
10. تقييم نقاط الضعف وإدارتها: تحديد نقاط الضعف في الأنظمة والشبكات وتقييمها والتخفيف من حدتها.
11. إدارة مخاطر الأمن: فهم وإدارة المخاطر المرتبطة بأنظمة المعلومات.
12. الطب الشرعي للكمبيوتر: التحقيق في الجرائم الرقمية وتحليل الأدلة الرقمية.
13. مبادئ أمن الشبكات: حماية البنية الأساسية للشبكة وضمان الاتصالات الآمنة.
14. التشفير: تقنيات الاتصالات الآمنة وحماية البيانات.
15. الاستجابة للحوادث: الاستجابة لحوادث الأمن السيبراني وإدارتها بشكل فعال.
16. اختبار الاختراق: محاكاة الهجمات الإلكترونية لتحديد نقاط الضعف الأمنية.
17. إدارة المعلومات الأمنية والأحداث **(SIEM):** استخدام أدوات لمراقبة الأحداث الأمنية وتحليلها.

2. Program Objectives

The program objectives of the Networks Engineering and Cybersecurity Department are:

1. Provide learning opportunities to develop students' skills and values in network engineering and cybersecurity.
2. Providing educational experiences and laboratory exercises that help students discover and enhance their abilities, talents, and interests.
3. Making students appreciate their important bases in designing and deploying wired and wireless networks that support the era of digital transformation.
4. Graduating competent students who are sufficiently qualified to meet the challenges of the high level.
5. Engage with market demands by preparing network engineering and cybersecurity that can plan, design, configure, and maintain wired and wireless networks and Protecting network infrastructure and ensuring secure communication.
6. Pursuing graduate studies and research in major research universities in the field of network engineering and cybersecurity and related fields
7. Participation and contribution to professional associations and community service

أهداف البرنامج لقسم هندسة الشبكات والامن السيبراني هي:

1. توفير فرص التعلم لتنمية مهارات الطلاب وقيمهم في هندسة الشبكات والامن السيبراني.

2. توفير الخبرات التعليمية والتمارين المخبرية التي تساعد الطالب على اكتشاف، وتعزيز قدراتهم ومواهبهم واهتماماتهم.
3. جعل الطلاب يقدرون قواعدهم المهمة في تصميم ونشر الشبكات السلكية واللاسلكية التي تدعم عصر التحول الرقمي.
4. تخريج طلاب أكفاء مؤهلين بشكل كاف لتحديات المستوى العالي.
5. الانخراط في متطلبات السوق من خلال إعداد هندسة الشبكات والامن السيبراني التي يمكنها تخطيط وتصميم وتكوين وصيانة الشبكات السلكية واللاسلكية وتوفير الحماية الازمة لبيئتها الداخلية، وضمان اتصال امن.
6. متابعة الدراسات العليا والبحث في الجامعات البحثية الكبرى في مجال هندسة الشبكات والامن السيبراني والمجالات ذات الصلة
7. المشاركة والمساهمة في الجمعيات المهنية وخدمة المجتمع.

3. Student Learning Outcomes

The outcomes of the Department of Network Engineering and Cybersecurity is to provide the best quality Network Engineering and Cybersecurity by offering a broad-based education, encouraging life-long learning, fostering teamwork and leadership, and promoting creativity and competitiveness. Furthermore, The outcomes can support technological development and innovation and deliver high-quality state-of-the-art research both theoretical and applied. that meet the needs of industry and the local community.

The graduates of the program of Network Engineering and Cybersecurity will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

مخرجات تعلم الطالب

تتمثل نتائج قسم هندسة الشبكات والامن السيبراني في توفير أفضل جودة لهندسة الشبكات من خلال تقديم تعليم واسع النطاق ، وتشجيع التعلم مدى الحياة ، وتعزيز العمل الجماعي والقيادة ، وتعزيز الإبداع والقدرة التنافسية. علاوة على ذلك ، يمكن للنتائج أن تدعم التطور التكنولوجي والابتكار وتقدم بحثًا متطورًا عالي الجودة نظريًا وتطبيقيًا. التي تلبي احتياجات الصناعة والمجتمع المحلي.

سيكون لخريجي برنامج هندسة الشبكات والامن السيبراني:

1. القدرة على تحديد وصياغة وحل المشكلات الهندسية المعقدة من خلال تطبيق مبادئ الهندسة والعلوم والرياضيات
2. القدرة على تطبيق التصميم الهندسي لإنتاج الحلول التي تلبي الاحتياجات المحددة مع مراعاة الصحة العامة والسلامة والرفاهية ، وكذلك العوامل العالمية والثقافية والاجتماعية والبيئية والاقتصادية.
3. القدرة على التواصل بشكل فعال مع مجموعة من الجماهير
4. القدرة على التعرف على المسؤوليات الأخلاقية والمهنية في المواقف الهندسية وإصدار أحكام مستنيرة ، والتي يجب أن تأخذ في الاعتبار تأثير الحلول الهندسية في السياقات العالمية والاقتصادية والبيئية والمجتمعية
5. القدرة على العمل بفعالية في فريق يعمل أعضاؤه معًا على توفير القيادة ، وخلق بيئة تعاونية وشاملة ، وتحديد الأهداف ، وتخطيط المهام ، وتحقيق الأهداف
6. القدرة على تطوير وإجراء التجارب المناسبة ، وتحليل وتفسير البيانات ، واستخدام الحكم الهندسي لاستخلاص النتائج
7. القدرة على اكتساب وتطبيق المعرفة الجديدة حسب الحاجة ، باستخدام استراتيجيات التعلم المناسبة

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2. Credits, Grading and GPA

Credits

(Al Iraqia) University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   CGPA of a 4-year B.Sc. degree:

   CGPA = [(1st ^{m}odule score x ECTS) + (2nd ^{m}odule score x ECTS) + ……] / 240

3. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MATH 1101	Mathematics |	63	62	125	5.00	None
ELCA 1102	Electrical Circuit Analysis I	78	47	125	5.00	None
LOCD 1103	Logic Circuit Design	78	47	125	5.00	None
EDR 122	Engineering Drawing	63	37	100	4.00	None
PHYS 1105	Physics	33	67	100	4.00	None
ENLA102	English Language	33	17	50	2.00	None
HRAD103	Human Rights	33	17	50	2.00	None
CHEM 1108	Chemistry	33	42	75	3.00	None

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MATH 1201	Mathematics ||	63	37	100	4.00	MATH 1101
ELCA 1202	Electrical Circuit Analysis ||	63	37	100	4.00	ELCA 1102
DISD 1203	Digital System Design	63	37	100	4.00	LOCD 1103
TEWO 1204	Technical Workshop	48	27	75	3.00	None
ELCD 1105	Electronic Circuit Design	63	37	100	4.00	None
COPR 1206	Computer Programming |	93	82	175	7.00	None
ARLA101	Arabic Language	33	17	50	2.00	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MATH 2101	Mathematics |||	48	52	4.00	B	MATH 1201
DIEL 2102	Digital Electronic	139	61	8.00	C	DISD 1203
COAR 2103	Computer Architecture	63	37	4.00	C	None
OBOP 2104	Object Oriented Programming OOP	79	71	6.00	C	COPR 1205
COMM 2105	Communication |	79	71	6.00	C	None
HURI 2106	Human Rights	33	17	2.00	S	None

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
MATH 2201	Mathematics IV	48	52	4.00	B	MATH 2101
COMM 2202	Communication ||	79	71	6.00	C	COMM 2105
DASY 2203	Database Systems	94	81	7.00	C	None
CONE 2204	Computer Network |	79	71	6.00	C	None
COPO 2205	Computer Programming ||	64	36	4.00	C	COPR 1205
OPSA 2206	Operating Systems and Applications	33	42	3.00	B	None

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ADMA 3101	Advance Mathematics |	48	52	4.00	B	MATH 2201
MICR 3102	Microprocessor	94	106	8.00	C	COAR 2103
OPCO 3103	Optical Communication	64	86	6.00	C	COMM 2202
SISY 3104	Signals and Systems	63	37	4.00	C	None
IMPR 3105	Image Processing	94	56	6.00	B	None
NEOS 3106	Network Operating System	33	17	2.00	C	None

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ADMA 3201	Advance Mathematics ||	48	52	4.00	B	ADMA 3101
DISP 3202	Digital Signal Processing	33	17	2.00	C	SISY 3104
COEN 3203	Control Engineering	64	86	6.00	C	ADMA 3103
ANPR 3204	Antenna and Propagation	64	86	6.00	C	ADMA 3104
INTH 3205	Internet of Things	64	86	6.00	C	None
CONE 3206	Computer Network ||	64	86	6.00	C	CONE 2204

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NEPR 4101	Network Protocol	109	91	8.00	C	CONE 3206
QUTH 4102	Queueing Theory	33	67	4.00	C	CONT 3203
MOCO 4103	Mobile Communication	48	52	4.00	C	DICO 3104
MALE 4104	Machine Learning	64	86	6.00	C	None
GPRM 4105	Graduation Project and Research Methodology	33	67	4.00	C	Level 3 Pass
SOEN 4106	Software Engineering	48	52	4.00	B	None

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
SOCO 4201	Soft Computing	94	56	6.00	C	MALE 4104
WISN 4202	Wireless Sensor Network	64	86	6.00	C	NEPR 4101
NESE 4203	Network Security	33	67	4.00	C	None
OPNE 4204	Optical Network	64	86	6.00	C	OPCO 3103
CLCO 4205	Cloud Computing	64	36	4.00	C	None
GPRM 4206	Graduation Project and Research Methodology	33	67	4.00	C	PRRM 4105

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Al Iraqia University
الجامعة العراقية

First Cycle – Bachelor's Degree (B.Sc.) - Networks Engineering and cyber security

بكالوريوس - هندسة الشبكات



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1. Overview

This catalogue is about the courses (modules) given by the program of Networks Engineering and cyber security to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الشبكات والامن السيبراني للحصول على درجة بكالوريوس في الهندسة. يقدم البرنامج (48) مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2025-2026

Module 1

Code	Course/Module Title	ECTS	Semester
MATH 1101	Mathematics |	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The aims of the module are to introduce engineering students to the central role that mathematics plays in the development and practice of engineering. To help students to begin to develop the skill of analyzing problems in a rational (rigorous, logical) and methodical manner. To develop the students' ability to transfer their mathematical understanding (and the associated methods) to diverse engineering application areas. Topics covered are: Matrices, Solving a system of linear equations, Eigen value and Eigen vector, Functions :graphs , domain and range, Limit and continuity, Differentiation, Chain rule, implicit Differentiation, derivations, integrations of trigonometric functions, natural logarithm , exponential, and other functions.			

Module 2

Code	Course/Module Title	ECTS	Semester
ELCA 1102	Electrical Circuit Analysis I	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			
At the end of the module, the student will learn the direct- current (DC) part of electrical circuits and different methodologies to analysis DC circuits. The core subjects covered in this course include Ohm's law, Kirchhoff's laws, node voltage analysis, mesh current analysis, Thevinon , Norton, super-position theorems, and transient analysis.			

Module 3

Code	Course/Module Title	ECTS	Semester
LOCD 1103	Logic Circuit Design	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	21
Description			
Students are supposed to learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Core topics covered include number systems, Logic Gates, Boolean Algebra, combinational circuits, and various related optimization techniques.			

Module 4

Code	Course/Module Title	ECTS	Semester
ENDR 1104	Engineering Drawing	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	37
Description			
Engineering Drawing, also known as Technical Drawing or Engineering Graphics, is a discipline that involves creating detailed visual representations of engineering designs, concepts, and components. It is a form of communication that allows engineers and designers to convey information about dimensions, specifications, and geometries of objects or systems. At the end of this module, students			

are able to, Produce an engineering drawing, Draw a complete drawing with proper dimensions and scale, Differentiate different type of drawings, Read and analyze engineering drawings, Produce work in a given time, and Using the computer in the engineering drawing.

Module 5

Code	Course/Module Title	ECTS	Semester
ELCD 1105	Electronic Circuit Design	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	124	76
Description			
The aim of this module is to enable the student to have a solid background in electronic physics and the analysis of the characteristics and circuits of diode and zener diode. In addition, the student will learn the specifications and applications of the diode and zener diode. Also, the student will learn BJT, and FET transistors, also the analysis and biasing circuits of the BJT and FET transistors.			

Module 6

Code	Course/Module Title	ECTS	Semester
ENLA 1106	English Language	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	0	59	41
Description			
This module focus on introducing the concepts and rule of academic english language.			

Module 7

Code	Course/Module Title	ECTS	Semester
MATH 1201	Mathematics ||	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
At the end of the module, the student will be familiar with basic principles of integration techniques, partial derivatives, and solution of different types of differential equations.			

Module 8

Code	Course/Module Title	ECTS	Semester
ELCA 1202	Electrical Circuit Analysis ||	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			
At the end of the module, the student will learn the fundamentals of Alternating current (AC) electrical circuits and analysis of single and three-phase systems. The main topics covered in this course includes alternating quantities, analysis of single and three phase systems, and resonance phenomenon in AC circuits.			

Module 9

Code	Course/Module Title	ECTS	Semester
DISD 1203	Digital System Design	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			
Students are supposed to learn the basic techniques and methodologies for designing and analyzing digital systems and how to apply these techniques to build specific circuits. Core topics covered include Functions of Combinational Logic, Latches, Flip-Flops, and Timers, Counters, Shift Registers, and various related optimization techniques.			

Module 10

Code	Course/Module Title	ECTS	Semester
TEWO 1204	Technical Workshop	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	37
Description			
Technical workshop aim to improve the student's skills that deals with an electronic component and any physical entity in an electronic system used to affect the electrons or their associated fields in a manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or			

oscillator). Components may be packaged singly, or in more complex groups as integrated circuits. Some common electronic components are capacitors, inductors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and thyristors) or passive (e.g. resistors, diodes, inductors and capacitors.

Module 11

Code	Course/Module Title	ECTS	Semester
COPR 1205	Computer Programming |	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	124	76
Description			
The objectives of this module are to provide an introduction to basic programming techniques, including the design and implementation of algorithms, structured programming techniques.			

Module 12

Code	Course/Module Title	ECTS	Semester
ARLA 1206	Arabic Language	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
The aim of this module to intoduce the main concepts of writing by using arabic language.			

Module 13

Code	Course/Module Title	ECTS	Semester
MATH 2101	Mathematics |||	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The aims of the module are to introduce engineering students to the central role that mathematics plays in the development and practice of engineering. To help students to begin to develop the skill of analyzing problems in a rational (rigorous, logical) and methodical manner. To develop the students' ability to transfer their mathematical understanding (and the associated methods) to diverse engineering application areas. Topics covered are: Partial derivatives, Chain rule, Maxima, minima, and saddle points, Vectors, Equations of lines and planes in space, Multiple Integrals, Sequences,			

series.

Module 14

Code	Course/Module Title	ECTS	Semester
DIEL 2102	Digital Electronic	8	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	5	139	61
Description			
After learning this module, the students should be able to Understand the construction and working of different combinational circuits etc, different flip-flops and its applications, different sequential logic circuits and basic design of sequential circuits and counters, Understand different types of memories and its applications, and the fundamentals of D/A and A/D converters			

Module 15

Code	Course/Module Title	ECTS	Semester
COAR 2103	Computer Architecture	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	0	63	37
Description			
This module focus on the principles and concepts of the internal organization and architecture of computers, such as processor , memory , input/output organizations , instruction pipelining, and parallel processing.			

Module 16

Code	Course/Module Title	ECTS	Semester
OBOP 2104	Object Oriented Programming OOP	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			

The module focuses of the principles and concepts of object oriented programming in C++ and advanced programming techniques. The student will be able to understand pointers, structures, classes and objects, use OOP principles with classes, use templates, handling exceptions, and deal with STL, streams and files. Also, the students will be able to design and implement Object-Oriented software to solve moderately complex problems.

Module 17

Code	Course/Module Title	ECTS	Semester
COMM 2105	Communication I	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			
This module focus on explaining the basic concepts of communication systems, and explain the analog modulation types.			

Module 18

Code	Course/Module Title	ECTS	Semester
HURI 2106	Human Rights	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
The aim of this module to explain the principles of human rights and Democracy.			

Module 19

Code	Course/Module Title	ECTS	Semester
MATH 2201	Mathematics IV	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The aims of the module are to introduce engineering students to the central role that mathematics plays in the development and practice of engineering. To help students to begin to develop the skill of analyzing problems.			

Module 20

Code	Course/Module Title	ECTS	Semester
COMM 2202	Communication ||	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			
The aim of this module is explaining entropy and compressbility, shannon and Huffman codes, and arithmetic coding.			

Module 21

Code	Course/Module Title	ECTS	Semester
DASY 2203	Database Systems	7	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	94	81
Description			
This module focuses on the concepts and principles of the database systems. Upon successful completion of this module, the student will be able to understand rational databases, write SQL commands and queries, E/R model and diagram, normalization , Indexing and hashing, and other topics related to the database systems.			

Module 22

Code	Course/Module Title	ECTS	Semester
CONE 2204	Computer Network |	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	79	71
Description			

This module introduce the concept and methods of computer networks to the students. The students will be able to understant the basics of computer networking and gain practical skills to deal with networks.

Module 23

Code	Course/Module Title	ECTS	Semester
COPO 2205	Computer Programming ||	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	36
Description			
In this module, the students gain the knowledge about the principles and concepts of programming techniques by using python programming language.			

Module 24

Code	Course/Module Title	ECTS	Semester
OPSA 2206	Operating Systems and Applications	3	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	42
Description			
The student will be taught principles of modern operating systems. In particular, the course will cover details of concurrent processes, multi-threads, CPU scheduling, memory management, file system, storage subsystem, and input/output management.			

Module 25

Code	Course/Module Title	ECTS	Semester
ADMA 3101	Advance Mathematics |	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			

The module focus on probability and statistics, which is a branch of mathematics that focuses on understanding and analyzing uncertainty, randomness, and data. It explores concepts and techniques for quantifying, interpreting, and making inferences from data in various fields such as science, engineering, economics, and social sciences.

Module 26

Code	Course/Module Title	ECTS	Semester
MICR 3102	Microprocessor	8	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	94	106
Description			
The aims of this module are to understand the architecture, registers, flags, pins configuration, and addressing modes of 8086 microprocessor, also the instructions and programming using Assembly language, and The interfacing of microprocessor with I/O peripheral ICs.			

Module 27

Code	Course/Module Title	ECTS	Semester
OPCO 3103	Optical Communication	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
The objective of this module is to provide a basic introduction to the concepts and methods of Optical Communication.			

Module 28

Code	Course/Module Title	ECTS	Semester
SISY 3104	Signals and Systems	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	0	63	37
Description			

The objective of this module is to provide a basic introduction to the theory of digital signal processing (DSP). Much of what we do extends these ideas to the field of discrete time systems. Major parts of the module will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more topics.

Module 29

Code	Course/Module Title	ECTS	Semester
IMPR 3105	Image Processing	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	2	94	56
Description			
The purpose of this module is to impart knowledge on the basic concepts of the image processing. To study the image fundamentals and mathematical transforms necessary. Also, to understand the image enhancement techniques, image restoration procedures, the image compression procedures, and the image segmentation and representation techniques.			

Module 30

Code	Course/Module Title	ECTS	Semester
NEOS 3106	Network Operating System	2	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
This module covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include interposes communication, distributed processing, sharing and replication of data and files. Approximately two third of the module will be devoted to basic concepts and techniques, and the remaining third will be on assorted current topics in modern operating systems and distributed systems.			

Module 31

Code	Course/Module Title	ECTS	Semester
ADMA 3201	Advance Mathematics ||	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52

Description
The module focus on numerical analysis, which is a field of study within mathematics and computer science that focuses on developing and analyzing numerical algorithms for solving mathematical problems. It involves the use of computational methods to approximate solutions to complex mathematical equations and problems that may not have exact analytical solutions.

Module 32

Code	Course/Module Title	ECTS	Semester
DISP 3202	Digital Signal Processing	2	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
The objective of this module is to provide an introduction to the Fourier and Laplace transforms and concepts such as linearity and shift invariance that are used in the description and analysis of linear analog systems. Much of what we do extends these ideas to the field of discrete time systems. Major parts of the module will concentrate on signal analysis using Fourier transforms, linear system analysis, Filter design and a few more advanced topics. We will study the discrete Fourier transform and its properties. The Students will also study the sampling theorem and the relationship between continuous and discrete time transforms.			

Module 33

Code	Course/Module Title	ECTS	Semester
COEN 3203	Control Engineering	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
The module provides the students the essential knowledge related to control system. Also the module aims at giving the student adequate skills in mathematical modelling, block diagram reduction, time domain analysis (transient and steady state) and control system stability.			

Module 34

Code	Course/Module Title	ECTS	Semester
ANPR 3204	Antenna and Propagation	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	2	64	86
Description			
The objective of this module is to introduce the fundamental principles of antenna to analysis of antenna systems. Students will learn how to characterize antennas and how to use antennas.			

Module 35

Code	Course/Module Title	ECTS	Semester
INTH 3205	Internet of Things	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
describes the network of physical objects—"things"—that are embedded with sensors, software, and IOT systems. The module will cover all aspects of these unique and important systems, from the hardware and radio architecture through protocols and software to applications.			

Module 36

Code	Course/Module Title	ECTS	Semester
CONE 3206	Computer Network ||	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
At the completion of the module the student will understand the advanced concepts and principles of computer networking.			

Module 37

Code	Course/Module Title	ECTS	Semester
NEPR 4101	Network Protocol	8	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	3	109	91

Description
At the completion of the module, the student will be able to Explain the basics of current computer networking protocols., Write simple programs for network communication.

Module 38

Code	Course/Module Title	ECTS	Semester
QUTH 4102	Queueing Theory	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	67
Description			
This module aims to prepare students with a good mathematical background in order to formally analyze the performance of various designs in computer systems and networks. Being able to analyze a design before it is physically implemented, or even after the implemented system starts its operation, has been proved to be an important ability for system designers. As computer systems and networks can be modeled as queuing systems, queuing theory serves as the key for performance analysis work.			

Module 39

Code	Course/Module Title	ECTS	Semester
MOCO 4103	Mobile Communication	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The primary objectives of this module are to Understand the fundamentals of wireless communications, Define the types of cellular systems and cellular wireless networks, Identify the requirements and limitations of 2G, 2.5G and 3G wireless mobile communication, Design the architecture of various wireless telecommunication systems, Analyze (TDMA/FDMA/CDMA) system according to the complexity, installation cost, speed of transmission, channel properties etc.			

Module 40

Code	Course/Module Title	ECTS	Semester

MALE 4104	Machine Learning	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
The primary aim of this module is to understands the main concepts, principles, and method of machine learning, and how to use them to solve problems in the real world.			

Module 41

Code	**Course/Module Title**	**ECTS**	**Semester**
GPRM 4105	Graduation Project and Research Methodology	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	67
Description			
This aims of this module are to intoduce the concepts and methods of academic research to the students, also, the main principles of writing graduation projects, where the Graduation Project is a formal assignment chosen by a student or small group of students on a topic related to the network engineering and involves out-of-class research and development.			

Module 42

Code	**Course/Module Title**	**ECTS**	**Semester**
SOEN 4106	Software Engineering	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The aim of this module is to introduce some types of system model that may be developed as part of the requirements of engineering and system design processes, the student should understand how graphical models can be used to represent software systems.			

Module 43

Code	**Course/Module Title**	**ECTS**	**Semester**
SOCO 4201	Soft Computing	6	8

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	94	56
Description			
The aim of this module are to Introduce the basic principles, techniques and applications of soft computing, Study the concepts and algorithms involved in neural networks, Explain Artificial Neural Networks and its categories, Design NN based solutions for real-world and engineering problems. Also, this module will focus on genetic algorithm, genetic programming, and fuzzy logic principles and concepts.			

Module 44

Code	Course/Module Title	ECTS	Semester
WISN 4202	Wireless Sensor Network	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
The primary aims of this module are to obtain a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks, Get in-depth hands-on experience in designing and developing a real operational embedded network system using ZigBee.			

Module 45

Code	Course/Module Title	ECTS	Semester
NESE 4203	Network Security	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	67
Description			
Understand security concepts, Ethics in Network Security, Understand security threats, and the security of computers.			

Module 46

Code	Course/Module Title	ECTS	Semester

OPNE 4204	Optical Network	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	86
Description			
The objective of this course is to introduce the principles, methods and principles of Optical Network .			

Module 47

Code	**Course/Module Title**	**ECTS**	**Semester**
CLCO 4205	Cloud Computing	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	36
Description			
This module focuses on Cloud computing and the on-demand availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user.			

Module 48

Code	**Course/Module Title**	**ECTS**	**Semester**
GPRM 4206	Graduation Project and Research Methodology	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	67
Description			
This aims of this module are to intoduce the concepts and methods of academic research to the students, also, the main principles of writing graduation projects, where the Graduation Project is a formal assignment chosen by a student or small group of students on a topic related to the network engineering and involves out-of-class research and development.			

Contact

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الملحق (٤)

وصف المادة الدراسية

Module Description Form

AL IRAQIA UNIVERSITY
الجامعة العراقية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ELCA 1102				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	**Semester of Delivery**		1
Administering Department		Networks	**College**		
Module Leader	Arwa Amir		**e-mail**	Eng.arwa.amir@gmail.com	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ms.c
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1.Basic Electrical Quantities and Units: • Electric charge, current, voltage, and power • Ohm's law 2. Circuit Elements and Symbols: • Passive circuit elements: resistors, capacitors, and inductors • Active circuit elements: voltage sources, current sources, and amplifiers • Circuit symbols and conventions • Circuit Laws and Techniques: 3. Kirchhoff's laws (Kirchhoff's current law and Kirchhoff's voltage law) • Series and parallel circuits analysis • Voltage and current division rules • Superposition theorem and its application • Thevenin's and Norton's theorems 4. DC Circuit Analysis: • Node and mesh analysis techniques • Nodal and mesh equations and their solutions

	• Power calculations in DC circuits • Analysis of voltage dividers and current dividers

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	•Electric charge, current, voltage, and power. •Ohm's law.
Week 2	• Power and Energy.
Week 3	• Series dc Circuits, Kirchhoff's Voltage Law.
Week 4	• Voltage Division in a Series Circuit.
Week 5	• Parallel dc Circuits, Kirchhoff's Current Law.
Week 6	• Current Divider Rule.
Week 7	• Mid-Exam, Voltage Sources in Parallel.
Week 8	• Open and Short Circuits, Series-Parallel Circuits.
Week 9	• Mesh Analysis.
Week 10	• Nodal Analysis.
Week 11	• Star to delta Conversions.
Week 12	• Delta to star Conversions
Week 13	• Thévenin's Theorem.
Week 14	• Norton's Theorem.
Week 15	• Review and revision
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Power Supply and Digital Multimeter.
Week 2	Ohm's Law.
Week 3	Series & Parallel Circuits.
Week 4	Voltage and Current Divider.
Week 5	Delta -Star Concession.
Week 6	Mesh Analysis.
Week 7	Nodal Analysis.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition.	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronic Circuit Design**			**Module Delivery**	
Module Type	core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ELCD 1105				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	UGI		**Semester of Delivery**	one	
Administering Department	Network Department		**College**	College of Engineering	
Module Leader			**e-mail**	@aliraqia.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/6/2023		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	none	**Semester**	
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course aims to: 1- enable the student to have a solid background in electronic physics. 2- enable the student to have a solid background in the analysis of the characteristics and circuits of diode and Zener diode. 3- The student will learn the specifications and applications of the diode and Zener diode. 4- enable the student to have a solid background in physical structure of BJT 5- enable the student to have a solid background in physical structure of FET transistors 6- enable the student to analyze the circuits of the BJT and FET transistors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Will be able to tell theory of semiconductors: Explains an atom and basic terms related with an atom. 2- Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. 3- Recognizes p and n type materials and explains characteristics of these materials. 4- Will be able to recognize types of diodes, explain basic terms related with diodes and tell the operating principle of diodes. 5- Recognizes half-wave, full-wave and bridge rectifier circuits and explains the 6- The student will be able to tell the structure and the operation of transistors and their types. 7- The student will recognize the different configurations of circuits with transistors and the characteristics of these circuits and compare these circuits. 8- Analyzes transistor dc biasing. 9- Explains the operation of transistor dc biasing circuits. 10- Will be able to explain different circuits with transistors.
Indicative Contents المحتويات الإرشادية	1. Will be able to tell theory of semiconductors. • Explains an atom and basic terms related with an atom. • Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. • Recognizes p and n type materials and explains characteristics of these materials. 2. Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes. • Recognizes types and the construction of diodes. • Explains ideal diode, equivalent circuit, and dc characteristic of a diode. • Tells the operating principles of diodes and Zener diodes.

	3. Will be able to analyze different diode circuits. • Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. • Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. • Analyzes and measures parameters in basic diode circuits. 4. Will be able to tell the structure and the operation of transistors and recognize the different types of transistors. 5. Recognizes the different configurations of circuits with transistors and the characteristics of these circuits and compares these circuits. 6. Analyzes transistor dc biasing. 7. Explains the operation of transistor dc biasing circuits. 8. Will be able to explain different circuits with transistors.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	124	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	30% (30)	3,5,12	LO #2,3 and 6
	Assignments	2	10% (10)	6,13	LO # 3 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** 1-1 Atomic structure & electronic state (orbit, energy and valence) of electron. 1-2 semiconductors, conductors and isolators. 1-3 effects of temperature on depletion layer and P-N junction.
Week 2	**Characteristics of Diode** 2-1 forward and reverse bias and its relations. 2-2 the diode operation and its conditions. 2-3 Zener region in terms of voltage and power dissipations
Week 3	**Specifications of diode** 3-1 diode capacitance 3-2 reverse recovery time 3-3 diode measuring and testing.
Week 4	**Diode applications** 4-1 load line analysis 4-2 series diode configuration 4-3 parallel & series configurations 4-4 half – wave rectifier and peak reverse voltage 4-5 full wave rectifier and related circuits (biased, diode clippers and clampers) 4-6 Zener diode and its applications
Week 5	**DC & AC resistance**
Week 6	**Midterm +** Introduction to transistor structure and its operations.

Week 8	**Configuration of transistor:** **bias configuration of a common- base** **bias configuration of a common- emitter** **bias configuration of a common- collector**
Week 11	**Transistor amplifications, The operation of transistor and its limitations.**
Week 12	Voltage divider, emitter stabilize and voltage feedback, and DC biasing circuit and its characteristics
Week 13	Common- base and emitter follower configurations, Saturation level of transistor, Transistor switching configuration.
Week 14	**JFET characteristic**
Week 15	**JFET biasing**
Week 16	**Preparing for the final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Diode characteristics
Week 2	Lab 2: half wave and full awe
Week 3	Lab 3: Clipper diode
Week 4	Lab4: clamper diode
Week 5	Lab5: voltage regulator (zener diode)
Week 6	Lab 6: dc analysis of common base transistor
Week 7	Lab 7: dc analysis of common emitter transistor
Week 8	Lab 8: dc analysis of voltage divider transistor
Week 9	Lab 9: dc analysis of emitter follower transistor
Week 10	Lab 10: dc analysis of common base transistor
Week 11	Lab11: JFET characteristics
Week 12	Review for all labs

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	yes
Websites	(PDF) Electronic device and circuit theory 11th edition By Robert L. Boylestad | Viktor Reznov - Academia.edu	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MATH 1101**				
ECTS Credits	**4.00**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Networks engineering	**College**	College of engineering	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Make students able to analyze engineering problems and formulate mathematical models to solve them. 2. Understand mathematical concepts in engineering as apply matrix techniques to problems in engineering 3. Expressing linear transforms in other forms, such as matrix equations and vector equations. 4. Distinguishing between homogeneous and nonhomogeneous systems. 5. Apply systems of linear equations to problems in networking 6. Use the characteristic polynomial to find all eigenvalues and eigenvectors 7. In engineering, by domain and range one can used to design and optimize systems. 8. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes algebraic manipulation, trigonometric functions, calculus operations (such as differentiation and integration)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and perform operations on matrices, including addition, subtraction, multiplication, and determination. 2. Apply Cramer's rule to solve systems of linear equations. 3. Calculate determinants and use them to determine properties of matrices. 4. Determine eigenvalues and eigenvectors of matrices. 5. Analyze and graph functions, including determining their domain and range. 6. Evaluate limits and determine continuity of functions. 7. Apply differentiation rules, including the chain rule and implicit differentiation, to find derivatives. 8. Apply integration rules and techniques, including integration by parts and partial fractions, to find antiderivatives. 9. Solve problems involving definite and indefinite integrals. 10. Understand and graph trigonometric functions, and apply their properties to solve problems. 11. Perform derivations and integrations involving trigonometric functions 12. Apply logarithmic and exponential functions in solving problems, and perform derivations and integrations involving these functions.
Indicative Contents المحتويات الإرشادية	• Matrices: Introduction to matrices and their operations. Determinants of matrices. Cramer's rule for solving systems of linear equations. Inverse matrices. • Systems of Linear Equations: • Eigenvalues and Eigenvectors: Understanding eigenvalues and eigenvectors of matrices. • Real Numbers and Functions: Understanding real numbers and intervals. Graphing functions and determining their domain and range. • limit and continuity

	Introducing the concept of limit and continuity. • Differentiation: Differentiation rules and examples. Chain rule and implicit differentiation. • Integration: Integration rules and techniques. Definite and indefinite integrals. • Trigonometric functions properties , Derivatives and integrals of Trigonometric functions • Logarithmic and Exponential Functions: Derivatives and integrals of logarithmic and exponential functions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #10, LO #11
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Matrices: introduction, operation
Week 2	Matrix determination
Week 3	Inverse Matrices
Week 4	Solving a system of linear equations by Cramer's rule
Week 5	Solving a system of linear equations by inverse method
Week 6	Eigen value and Eigen vector
Week 7	(Mid-term Exam)
Week 8	Real Numbers, Intervals, Functions:graphs , domain and range
Week 9	Limit and continuity
Week 10	Differentiation
Week 11	Chain rule, implicit Differentiation
Week 12	Rules of integration, Definite and indefinite integrals
Week 13	trigonometric functions: derivations, integrations
Week 14	natural logarithm , exponential e^x: properties, derivations, integrations
Week 15	a^x, log_a^u : properties, derivations, integrations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS ,STEPHEN DAVIS	yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering drawing**			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENDR 1104**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The aim of this module is to provide students with a comprehensive understanding of engineering drawing principles and techniques. It aims to develop their skills in creating and interpreting technical drawings, which are essential in the field of engineering. The module also aims to enhance students' spatial visualization abilities and their understanding of the relationship between 2D representations and 3D objects. 2. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 3. The students will have skills to use that's program and drawing any things (2D). 4. Reading plans of projects . 5. How to make show for them projects . 6. Auto desk AutoCAD software provide powerful ,integrated 2D modeling, drawing ,and layers tools that enable designers to focus more energy on creative ,rather than technical challenges
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the principles and conventions of engineering drawing. 2. Apply appropriate techniques to create accurate and precise engineering drawings. 3. Interpret and analyze technical drawings, including dimensions and annotations. 4. Learn drawing skills by AutoCAD . 5. Learn to read construction plans by AutoCAD . 6. Increase the student's imagination by AutoCAD .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. <u>Introduction to Engineering Drawing</u> Importance of engineering drawing in the design and manufacturing process. Standards and conventions in engineering drawing. Types of technical drawings: orthographic projections, isometric projections, etc. 2. <u>Drawing Instruments and Techniques</u> Overview of drawing instruments and their uses Sketching techniques and line types Scaling, dimensioning, and labeling 3. <u>Orthographic Projections</u> Principles of orthographic projection Multiview drawings Sectional views and conventions

	4. Isometric Projections Introduction to isometric projections Isometric drawing techniques and isometric scales Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing. 5. Creating and Modifying Components by AutoCAD. 6.Modeling and Modifying Elements by AutoCAD.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this module, a combination of project-based learning, lectures, and group discussions will be utilized to create an engaging learning environment. Students will apply engineering drawing principles and techniques to real-world scenarios, participate in interactive lectures using visual aids and examples, collaborate in group discussions to analyze and problem-solve, engage in practical exercises and workshops to develop technical drawing skills with traditional tools and CAD software, and conduct independent study.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	12	15% (15)	Continuous	All
	Assignments	12	20% (20)	Continuous	All
	Projects / Lab.	3	5% (5)	12,13,14	

				and 15	
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Theoretical and Lab. Syllabus)

المنهاج الاسبوعي النظري والعملي

	Material Covered
Week 1	Principle of engineering drawing
Week 2	Sketching techniques and line types & Scaling, dimensioning, and labeling
Week 3	Principles of orthographic projection
Week 4	Multiview drawings in orthographic projection
Week 5	Sectional views and conventions
Week 6	Introduction to isometric projections
Week 7	Isometric drawing techniques and isometric scales
Week 8	Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing
Week 9	Mid exam
Week 10	1- Introduction - Theory lectures on history of AutoCAD program, what's new versions ,how to install program. 2- Explanation the main window for program, how to arrange it before start work.
Week 11	how to use file icon from the window(open,new,save ,save as,export,merge ,drawing properties .draw orders(line and construction line with types of lines (hidden and center lines)) and modify (erase,move,copy) Orthogonally ,snaps, grid, scale and explode .
Week 12	Draw Arcs,polyline,circles and rectangle Draw Ellipses ,trim and extend orders , rotate and mirror.
Week 13	term Exam + tutorial. And Application of previous orders. Layer order (how to change color,name,type and thickness of line by layer)
Week 14	Explanation of construction and architectural plans and types of lines.
Week 15	Explanation of construction and architectural plans and types of lines(showing examples) and Application of previous orders.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Manual of engineering drawing - Simmons C.H., Maguire D. E. 2-Autodesk AutoCAD 2021: Learn CAD With Ease (For Beginners) Hardcover – February 20, 2021 by Madhumita Kshirsagar.	no
Recommended Texts	1-Giesecke, Frederick Ernest, et al. Technical drawing with engineering graphics. Vol. 15. Prentice Hall, 2016. 2-French, Thomas Ewing, and Charles J. Vierck. The fundamentals of engineering drawing and graphic technology. McGraw-Hill Companies, 1978.	yes
Websites	https://www.autodesk.com/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Academic English I**			**Module Delivery**	
Module Type	**Basic learning activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ENG101**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Network Dep.	**College**	Engineering Collage	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name		Hussein Jumma Jabir	**e-mail**	hjjahmn@gmail.com	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To enable the learner to communicate effectively and appropriately in real-life situations. 2. To use English effectively for study purposes across the curriculum. 3. To develop and integrate the use of the two language skills, i.e., listening, speaking. 4. To develop interest in and appreciation of literature. 5. To revise and reinforce structures already learnt. 6. To basically translate from English to Arabic and vice versa.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	students should be able to:- 1. Read silently at varying speeds depending on the purpose of reading 2. Recognize the organization of a text. 3. Identify the main points of a text. 4. Adopt different strategies according to the purpose of listening. 5. Listen to a talk or conversation and understand the topic and main points. 6. Speak intelligibly using appropriate word stress, sentence stress and intonation patterns. 7.
Indicative Contents المحتويات الإرشادية	Indicative Contents include the following :- **<u>Part A-Grammar :-</u>** **Elementary / basic English grammar**: **Grammar** (1): verb to be , main verbs , Possessive adjectives. **Everyday English** (everyday conversation) **Grammar(2)** present simple (1) , questions and negative (jobs). present simple (2) , adverb of frequency, Past simple (1), regular and irregular verbs , prepositions (1) Time expression(1)) **Everyday English** (What time it is) (Social expression) **Grammar (3)**: Demonstrative Pronouns (there is , there are , that , this ,those) How much , How many , some , a lot of , any **Everyday English** (numbers and prices) **Grammar (4)**: Model verbs (can , could , ….) Was born , . **Everyday English** (polite requests) (what's the date) (special occasions) (Expressing doubt and certainty) meaning (14 Hours) **<u>Part B –Vocabulary</u>** Vocabulary :Synonyms , Antonyms : word endings , word stress , right word , wrong word , verbs with similar meaning , adjective and noun, (Regular and Irregular verbs) , Adverbs Vocabulary (Possessive's , adjective, oppositive adjective, adverbs , words that go together (verb+noun) or (noun +noun) , Vocabulary prepositions(2) , adverb (2) , Food and drink , daily needs, jobs, describing feeling and things .(12 Hours) **<u>Part C: Speaking -</u>** Speaking: speaking a technical report , a seminar ,

	Team work activities (discussion and conversation) Seminar skill (4 Hours) **Part D Translation: -** Translation a technical report from English to Arabic and from Arabic to English. Electrical engineering terms. (6 Hours)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	❖ Lectures: In-class lectures delivered by the instructor provide the foundational knowledge and theoretical concepts of English language . Lectures can include explanations, demonstrations, and the presentation of examples to illustrate key concepts. ❖ Interactive Discussions: Encourage active participation and engagement through interactive discussions. This can involve asking questions, facilitating group discussions, and encouraging students to share their insights and perspectives on grammar and English activities . ❖ Group team work: Assign groups that require students to apply their knowledge of English language. ❖ Guest Speakers: Invite language professionals or researchers in the field of language to share their experiences and insights. Guest speakers can provide real-world perspectives, discuss emerging trends, and inspire students in their learning journey. ❖ Online Resources and Multimedia: Provide access to online resources, textbooks, lecture recordings, and interactive multimedia materials that support the learning of English language. These resources can serve as supplementary materials for self-study and reinforce understanding. ❖ Formative and Summative Assessments: Incorporate a variety of assessment methods, including quizzes, assignments, lab reports, and examinations, to evaluate students' understanding and progress. Provide constructive feedback to help students improve their knowledge and skills in English language.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	7, 12	LO #1-5
	Assignments	2	10% (10)	4, 10	All
	Projects / Lab.	1	10% (10)	7	All
	Report	1	10% (10)	12	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Grammer (1)** - tenses (present , past , future) , question , questions word , **Everyday English** (social expression)
Week 2	**Grammer (2)** :Present tenses(present simple , present continuous (have and have got) **Everyday English** (Making conversation)
Week 3	**Grammer(3)** Past tenses (past simple , past continuous) **Vocabulary** (Regular and Irregular verbs) , Adverbs **Everyday English** (Saying when)
Week 4	**Grammer (4):** Quantity , articles **Everyday English** (Can you came for dinner , Requests
Week 5	**Grammer (5) :** Verbs patterns , future forms **Vocabulary** : Phrasal verb (literal , Idiomatic) **Everyday English** (Expressing doubt and certainty)
Week 6	**Grammer**(6) : Comparative and superlative adjective **Everyday English** : What's on
Week 7	**Grammer(7)** : Present perfect , Indefinite past , ever and never **Everyday English** :Agree with me go together , prepositions , word with two meaning
Week 8	**Vocabulary** :Synonyms , Antonyms : word endings , word stress , right word , wrong word , verbs with similar meaning , adjective and noun
Week 9	**Writing practice: narrative or descriptive essays**
Week 10	**Speaking**: speaking a technical report , a seminar , **Team work activities** (discussion and conversation) **Seminar skills**
Week 11	

Week 12	**Grammar review: passive voice and relative clauses.**
Week 13	**Error analysis and correction exercises**
Week 14	**Translation:** a technical report from English to Arabic and from Arabic to English. Network engineering terms.
Week 15	**Preparatory week before the final Exam**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**New Headway Oxford Elementary, Pre-intermediate, and Intermediate**	Yes
Recommended Texts	**"English File" by Oxford University Press and "New Headway" by Liz and John Soars**	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry Of Higher Education & Scientific Research Al-Iraqia University College of Engineering Networks Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	LOGIC CIRCUITS DESIGN	**Module Delivery**	
Module Type	**CORE**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	LOCD 1103		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	UGI	**Semester of Delivery**	One
Administering Department	Network Engineering	**College**	Engineering
Module Leader	Samar Kareem Ibrahim	**e-mail**	Samar.kareem90@gmail.com
Module Leader's Acad. Title	ASST. LECTURER	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	Digital System Design	**Semester**	Two
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. Introduce students to the basic concepts and terminology of digital logic design. 2. Familiarize students with the importance and relevance of logic circuits in modern technology. 3. Explore different number systems, including binary, decimal, octal and hexadecimal. 4. Discuss number system conversions and arithmetic operations. 5. Introduce basic logic gates (AND, OR, NOT) and their truth tables. 6. Discuss the behavior and operation of logic gates using Boolean algebra. 7. Teach methods for logic simplification, including Boolean laws, De Morgan's theorem, and Karnaugh maps. 8. Show how to simplify and optimize logic expressions using these techniques. 9. Introduce combinational logic circuits and their analysis. 10. Teach techniques for analyzing and designing combinational logic circuits using truth tables and logic gates. 11. Demonstrate how to construct and verify the functionality of combinational logic circuits.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the basic concepts and terminology of digital logic design. 2. Recognize the importance and relevance of logic circuits in modern technology. 3. Understand different number systems, such as binary, decimal, octal and hexadecimal. 4. Perform number system conversions and basic arithmetic operations. 5. Identify and describe the behavior of logic gates and their truth tables. 6. Analyze and design logic circuits using logic gates. 7. Implement logic gates using electronic components and symbols. 8. Apply Boolean algebra to simplify and manipulate logic expressions. 9. Employ Boolean laws, De Morgan's theorem, and Karnaugh maps for logic simplification. 10. Analyze and design combinational logic circuits using truth tables and logic gates.		

Indicative Contents المحتويات الإرشادية	1. Introductory concept 2. Number systems, operations, and codes 3. Logic gates 4. Boolean algebra and logic simplification 5. Combinational logic analysis
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to deliver theoretical concepts, principles, and foundational knowledge related to logic circuits design. Lectures can provide an overview of the subject matter, introduce key concepts, and explain complex topics in a structured manner. 2. Practical Sessions: Hands-on practical sessions are essential for understanding and applying logic circuits design principles. These sessions can involve designing and implementing logic circuits using physical hardware. Practical sessions allow students to gain practical skills and reinforce theoretical knowledge. 3. Problem-Solving Exercises: Assigning problem-solving exercises that require students to design and analyze logic circuits helps develop critical thinking and problem-solving skills. These exercises can range from simple logic gate configurations to complex combinational logic circuits. Students can work individually or in groups to solve these problems. 4. Assessment and Feedback: Regular assessments, such as quizzes, assignments, and exams, can be used to evaluate students' understanding of logic circuits design concepts. Providing timely feedback on assessments helps guide students' learning progress and identify areas for improvement.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10
	Assignments	2	10% (10)	2, 12	LO # 6 and 10
	Laboratory	1	10% (10)	Continuous	
Summative assessment	**Midterm Exam**	1 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**1 INTRODUCTORY CONCEPTS** 1.1 Digital and Analog Quantities 1.2 Binary Digits, Logic Levels, and Digital Waveforms 1.3 Basic Logic Functions
Week 2	1.4 Combinational and Sequential Logic Functions 1.5 Introduction to Number Systems 1.6 Fixed-Function Logic Devices
Week 3	**2 NUMBER SYSTEMS, OPERATIONS, AND CODES** 2.1 Decimal Numbers 2.2 Binary Numbers 2.3 Decimal-to-Binary Conversion 2.4 Binary Arithmetic 2.5 Complements of Binary Numbers
Week 4	2.6 Signed Numbers 2.7 Arithmetic Operations with Signed Numbers 2.8 Hexadecimal Numbers 2.9 Octal Numbers 2.10 Binary Coded Decimal (BCD)
Week 5	**3 LOGIC GATES** 3.1 The Inverter 3.2 The AND Gate 3.3 The OR Gate
Week 6	3.4 The NAND Gate 3.5 The NOR Gate 3.6 The Exclusive-OR and Exclusive-NOR Gates

Week 7	3.7 Fixed-Function Logic Gates
Week 8	**4 BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION** 4.1 Boolean Operations and Expressions 4.2 Laws and Rules of Boolean Algebra 4.3 DeMorgan's Theorems
Week 9	4.4 Boolean Analysis of Logic Circuits 4.5 Logic Simplification Using Boolean Algebra
Week 10	4.6 Standard Forms of Boolean Expressions 4.7 Boolean Expressions and Truth Tables
Week 11	4.8 The Karnaugh Map 4.9 Karnaugh Map SOP Minimization 4.10 Karnaugh Map POS Minimization
Week 12	**5 COMBINATIONAL LOGIC ANALYSIS** 5.1 Basic Combinational Logic Circuits
Week 13	5.2 Implementing Combinational Logic
Week 14	5.3 The Universal Property of NAND and NOR gates 5.4 Combinational Logic Using NAND and NOR Gates
Week 15	5.5 Pulse Waveform Operation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Logic Gates Introduction
Week 2	Lab 2: 2-inputs AND gates
Week 3	Lab 3: 2 inputs OR gates
Week 4	Lab 4: Hex inverter
Week 5	Lab 5: 2-inputs NAND gates
Week 6	Lab 6: 2-inputs NOR gates
Week 7	Lab 7: 2-inputs EX-OR gates
Week 8	Lab 8: Combinational logic circuits

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015	yes
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Architecture**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COAR2103**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	**Semester of Delivery**		three
Administering Department		ENG – EET	**College**	EETC	
Module Leader	Zainab abbas fadil		**e-mail**	Drzainababbas13@gmail.com	
Module Leader's Acad. Title		PH.D	**Module Leader's Qualification**		PH.D
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fundamental of computer system	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding the organization of computer systems: Computer architecture investigates how various hardware components, such as the central processing unit (CPU), memory, input/output devices, and storage, are organized and interconnected to perform computational tasks efficiently. 2. Designing efficient and effective computer systems: By studying computer architecture, engineers and designers can gain insights into designing computer systems that maximize performance, energy efficiency, reliability, and scalability. They can make informed decisions about selecting appropriate hardware and optimizing system configurations. 3. Enhancing system performance: Computer architecture helps in analyzing and improving the performance of computer systems by understanding how different components work together. It involves studying instruction sets, memory hierarchies, pipelining, parallel processing, and other techniques for improving the speed and efficiency of computations. 4. Evaluating trade-offs: Computer architecture involves examining the trade-offs between various design choices. For example, it may explore the balance between power consumption and performance, the trade-offs between cost and reliability, or the choices between different instruction set architectures. Understanding these trade-offs helps in making informed decisions when designing or selecting computer systems. 5. Enabling software optimization: Computer architecture provides insights into the underlying hardware mechanisms that impact software performance. By understanding how the hardware executes instructions, manages memory, and handles input/output operations, software developers can optimize their programs to take advantage of the available hardware resources more efficiently. 6. Advancing computer technology: Studying computer architecture contributes to the advancement of computer technology by identifying bottlenecks, proposing innovative solutions, and driving improvements in hardware design and system architecture. It lays the foundation for developing faster, more reliable, and more energy-efficient computer systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of computer organization: Students gain a comprehensive understanding of the organization and structure of computer systems. This includes knowledge of the components of a computer, such as the CPU, memory, storage devices, and input/output devices, and how they interact to execute instructions and process data. 2. Knowledge of instruction set architectures: Students learn about different instruction set architectures (ISAs) used in computer systems, such as x86, ARM, MIPS, and RISC-V. They understand the instruction formats, addressing modes, and the relationship between high-level programming languages and the underlying machine instructions. 3. Familiarity with memory hierarchies: Students gain knowledge of memory hierarchies, including registers, cache memory, main memory, and secondary storage. They learn about the principles of memory management, caching techniques, and the trade-offs between memory size, access time, and cost. 4. Understanding of pipelining and parallel processing: Students learn about

	pipelining techniques used to overlap the execution of multiple instructions to improve performance. They also explore concepts related to parallel processing, including multiple cores, threads, and instruction-level parallelism. 5. Ability to evaluate system performance: Students develop skills in evaluating and analyzing the performance of computer systems. They learn to measure metrics such as execution time, throughput, and latency, and understand how different architectural decisions impact system performance. 6. Knowledge of system-level optimization: Students acquire knowledge of techniques for optimizing computer systems at the system level. This includes understanding the impact of caching, branch prediction, instruction scheduling, and memory management on system performance. 7. Problem-solving and critical thinking skills: Studying computer architecture develops problem-solving and critical thinking skills. Students learn to analyze complex problems, identify design trade-offs, and propose solutions to improve system performance, energy efficiency, and reliability. 8. Programming and software optimization skills: Students develop skills in programming and software optimization by understanding the underlying hardware mechanisms. They learn to write code that maximizes performance by leveraging the architectural features and resources available. 9. Ability to design and evaluate computer systems: Students gain the ability to design and evaluate computer systems based on specific requirements. They can make informed decisions about selecting hardware components, configuring system parameters, and optimizing system performance for different applications.
Indicative Contents المحتويات الإرشادية	1. Introduction to Computer Architecture 2. Instruction Set Architecture (ISA) 3. CPU Organization and Execution: 4. Instruction pipelining concepts and challenges 5. Principles of parallel processing and concurrency 6. Input/Output Systems 7. Metrics for performance evaluation (execution time, CPI, speedup)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Main strategies will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. ● Theory-Based Lectures: Traditional classroom lectures are used to present theoretical concepts, principles. Professors or instructors explain complex ideas, provide examples, and engage students in discussions to foster understanding.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	3	10% (10)	2, 8, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	3	10% (10)	3, 6, 9	LO # 2, 5, and 8
	Report	2	10% (10)	4, 9	LO # 5 and 10
Summative assessment	**Midterm Exam**	2 hours	10% (10)	7	LO # 1-7
	Final Exam	3 hours	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Introduction: organization and architecture structure and function.
Week 2	• Computer function and interconnection (II): interconnection structure, bus interconnection, PCI
Week 3	• Memory Organization: • Concept of RAM/ROM, basic cell of RAM
Week 4	• Associative memory, Cache memory organization
Week 5	• Virtual memory organization
Week 6	• I/O Organization
Week 7	• Introduction to Peripherals & their interfacing
Week 8	• Strobe based and handshake-based communication, DMA based data transfer, I/O processor
Week 9	• CPU structure: processor organization , register organization CPU function : instruction cycle , instruction pipelining
Week 10	• Parallel Processing
Week 11	• Characteristics of Multiple Processors • Interconnection structure and arbitration
Week 12	• Inter-process communication and synchronization
Week 13	• Multi-core Computers
Week 14	• Hardware and software performance
Week 15	• Multi-core organization
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Computer Organization and Architecture: Designing for Performance • Morris Mano" Computer System Architecture",Thired edition • Joseph D. Dumas"Computer Architecture Fundamentals and Principles of Computer Design" CRC Press, 2006. • Miles J. Murdocca," Principles of Computer Architecture" ,Prentice Hall,1999	
Recommended Texts	• Miles J. Murdocca, Vincent P. Heuring," Computer Architecture and organization :An integrated Approach", Wiley, 2012 • Subrata Ghoshal, " Computer Architecture and organization From 8085 to Core 2Duo and beyond", Glyph International Pvt. Ltd,2011 • William Stallings " Computer Organization and Architecture Designing for Performance", 8th Edition, 201	
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication Fundamentals I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COMM2105				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Network engineering		**College**	College of engineering	
Module Leader	Zahraa Khduair Taha		**e-mail**	Zahraa.Khduair @aliraqia.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	master	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding Communication Systems: The subject aims to provide a fundamental understanding of analog communication systems. Students learn about the key components, concepts, and principals involved in the transmission and reception of signals in communication systems. 2. Signal Representation and Analysis: The subject focuses on the study of different signal representations, including continuous-time signals. Students learn to analyze signals using techniques such as Fourier transform. 3. Analog Communication Systems: The subject covers the principles and techniques used in analog communication systems. Students learn about modulation techniques, such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). They also study demodulation techniques and the impact of noise on analog signals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying analog communication systems. 2. Knowledge of Signal Representation: Acquire knowledge of various methods for representing analog signals, including time-domain and frequency-domain representations. 3. Familiarity with Analog Modulation Techniques: Gain an understanding of different analog modulation techniques such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). Understand the advantages, disadvantages, and applications of each technique. 4. Understanding of Noise and Channel Capacity: Learn about the effects of noise on communication systems and methods for mitigating its impact. Gain an understanding of channel capacity, bandwidth, and signal-to-noise ratio (SNR) calculations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Analog Communication Fundamentals: 1. Introduction to Analog Communication 2. Basic Concepts of Signals and Systems 3. Amplitude Modulation (AM) a. Amplitude Modulation Process b. Frequency Spectrum of AM Signal c. Modulation Index and Power Relations d. Demodulation Techniques for AM 4. Frequency Modulation (FM) a. Frequency Modulation Process b. Frequency Spectrum of FM Signal c. Deviation Ratio and Power Relations d. Demodulation Techniques for FM

	5. Noise and Distortion in Analog Communication a. Types of Noise and Their Characteristics b. Signal-to-Noise Ratio (SNR) c. Noise Figure and Noise Temperature

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Analog Communication Strategies: 1. Signal Conditioning: Analog signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Noise Reduction: Analog signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (10)	5 and 14	LO #1, #2 and #3, #4
	Assignments	2	10% (10)	2 and 14	LO #1, #2 and #3, #4
	Projects / Lab.	1	10% (10)	Continuous	All
	Midterm Exam	2hr	10% (10)	9	LO #1 - #3

Summative assessment	**Final Exam**	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Introduction to Communication Systems
Week 2	Elements of a Communication System and Mode of operations
Week 3	Fundamental Limitations and Modulation and Coding
Week 4	Review of Signal Classifications and Transmission of Signals through Linear Systems
Week 5	Linear modulation strategies that constitute the amplitude modulation family: Amplitude Modulation (AM)
Week 6	Double Sideband-Suppressed Carrier (DSB-SC): modulation and demodulation techniques
Week 7	Single Sideband (SSB): modulation and demodulation techniques
Week 8	superheterodyne receiver
Week 9	Mid-term Exam (from week 1 to week 8)
Week 10	Angle Modulation concepts and the Relationship between PM and FM Waves:
Week 11	Narrow-Band Frequency Modulation and Wide-Band Frequency Modulation
Week 12	Transmission Bandwidth of FM Waves and Generation of FM Waves
Week 13	Demodulation of FM Signals
Week 14	Commercial FM transmitter (PART 1)
Week 15	Commercial FM transmitter (PART 2)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction and Overview of the lab equipment
Week 2	Lab 2: Representation of Signals
Week 3	Lab 3: Amplitude Modulation
Week 4	Lab 4: Demodulation of an Amplitude Modulated Signal
Week 5	Lab 5: Generation of Frequency Modulation Signal

Week 6	Lab 6: Demodulation of Frequency Modulation Signal
Week 7	Lab 7: Review for all labs

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002	Yes
Recommended Texts	S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007	yes
Websites	https://www.coursera.org/learn/ analog communication fundamentals	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics III**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MATH 2101				
ECTS Credits	**4.00**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Networks engineering		**College**	College of engineering	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATH 1201	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Partial derivatives are useful in analyzing surfaces for maximum and minimum points and give rise to partial differential equations in next stage. 2. Learn basics of vectors for many engineering quantities, such as forces, displacements, velocities, and accelerations, will need to be represented as vectors for analysis. 3. The major applications of multiple integrals in engineering is the determination of properties of plane, and whenever an area or a volume under a 2D curve (a surface) needs to be measured 4. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes • impart the knowledge of sequences and summation of series • Represent functions as Taylor and Maclaurin series. 5. Understand their engineering application
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function 2. Understand the formula for the chain rule 3. Use the chain rule to find derivatives of composite functions 4. Apply the chain rule to a composition of three or more functions 5. View vectors geometrically 6. Find magnitude and direction 7. Perform vector addition and scalar multiplication 8. Find the component form of a vector 9. Find the unit vector in the direction of v 10. Perform operations with vectors in terms of i and j 11. Find the dot product of two vectors 12. Finding the equations of a line and of a plane 13. Evaluate a double integral 14. Setting up triple integrals for a region 15. Understanding the definition of a sequence 16. define what it means for a series to converge or diverge 17. Classifying a sequence as finite or infinite 18. Classifying a sequence as geometric, or neither 19. Learn to represent functions as Taylor and Maclaurin series.
Indicative Contents المحتويات الإرشادية	• PARTIAL DERIVATIVES Functions of Two or More Variables The Chain Rule Directional Derivatives and Gradients Tangent Planes and Normal Vectors Local Maxima and Minima of Functions of Two Variables • VECTORS Dot Product Cross Product Planes in Space • VECTOR-VALUED FUNCTIONS

	Introduction to Vector-Valued Functions • MULTIPLE INTEGRALS Double Integrals Double Integrals in Polar Coordinates Triple Integrals • Sequences Infinite Series Geometric Series Convergence Tests The Comparison, Ratio, and Root Tests Maclaurin and Taylor Series

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	11,12	LO #13 , LO #14
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fourier series - introduction.
Week 2	Half range Fourier series
Week 3	Partial derivatives
Week 4	Chain rule
Week 5	Maxima, minima, and saddle points
Week 6	Vectors: Introduction
Week 7	Vectors: properties, dot product
Week 8	Vectors: cross product
Week 9	(Mid-term Exam)
Week 10	Equations of lines and planes in space
Week 11	Vector function
Week 12	Multiple Integrals: Double Integrals
Week 13	Double Integrals using polar coordinate
Week 14	Triple integrals
Week 15	Taylor and Maclaurin series
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS , STEPHEN DAVIS	yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Electronic**			**Module Delivery**	
Module Type	**Basic learning activity**			☒ **Theory** ☒ **Lecture** ☒**Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DIEL 2102**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Network	**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding the fundamental concepts and principles of digital electronics. 2. Demonstrating knowledge of op am and operational amplifier . 3. Developing skills in analyzing and designing combinational and sequential logic circuits. 4. Gaining proficiency in using digital design tools and software. 5. Acquiring practical skills in implementing digital circuits using hardware components or programmable logic devices (PLDs). 6. Understanding the principles of digital signal processing and its applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	students should be able to:- 1. Understanding the principles of digital processing in electronics and its applications. 2. Familiarity with digital communication systems and protocols. 3. Developing problem-solving and critical thinking skills in the context of digital electronic systems. 4. Applying theoretical knowledge to practical projects or experiments in digital electronics. 5. Understanding the limitations and challenges associated with digital electronic systems.
Indicative Contents المحتويات الإرشادية	1. Introduction to Digital Electronics: - Basics of digital logic gates and Boolean algebra. - Number systems and binary arithmetic. - Combinational and sequential logic circuits. 2. Digital Circuit Design: - Combinational circuit design using logic gates. - Analysis and design of sequential circuits. - Flip-flops, registers, and counters. - State machines and their applications. 3. Integrated Circuit Technology: - Overview of integrated circuit fabrication. - MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor) technology. - CMOS (Complementary Metal-Oxide-Semiconductor) logic gates and circuits. 4. Digital System Components: - Multiplexers, decoders, and encoders. - Arithmetic circuits: adders, subtractors, and multipliers. - Memory devices: RAM, ROM, and programmable logic. 5. Digital System Analysis and Optimization: - Timing analysis and propagation delay. - Hazards and glitch avoidance. - Optimization techniques: Karnaugh maps, Quine-McCluskey method.

	6. Digital System Simulation and Verification: - Introduction to hardware description languages (HDLs) like VHDL or Verilog. - Simulation and testing of digital circuits using HDLs. - Verification techniques: testbenches, functional verification. 7. Digital System Integration and Interfacing: - Interfacing digital systems with external devices. - Serial and parallel communication protocols. - Introduction to microcontrollers and digital signal processors. 8. Emerging Trends in Digital Electronics: - FPGA (Field-Programmable Gate Array) technology and applications. - Digital signal processing and its impact on digital systems. - Introduction to emerging technologies such as quantum computing or neuromorphic engineering.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	❖ 1. Lectures: Instructors deliver lectures to present theoretical concepts, principles, and applications of digital electronics. This can include using visual aids, demonstrations, and examples to enhance understanding. ❖ 2. Practical Labs: Hands-on laboratory sessions allow students to apply theoretical knowledge by designing, building, and testing digital circuits. This helps students develop practical skills and reinforce their understanding of concepts. ❖ 3. Problem-Solving Exercises: Assigning problem-solving exercises and assignments helps students apply their knowledge to solve real-world problems related to digital electronics. This encourages critical thinking and problem-solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	139	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	9

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	7, 12	LO #1-5
	Assignments	2	10% (10)	4, 10	All
	Projects / Lab.	1	10% (10)	7	All
	Report	1	10% (10)	12	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	introduction analog system, and operational amplifier Non-inverting OP-AMP. & Inverting OP-AMP.
Week 2	basic element of op amp Voltage follower. & Voltage adder.
Week 3	Integrator , Differentiator .and Difference Amp
Week 4	A/D convertors. & Simultaneous ADC. Counter type ADC.
Week 5	Continuous ADC. Successive approximation ADC. & Variable resistor network.
Week 6	D/A Convertor, Resistive divider DAC. & Binary ladder DAC, DAC accuracy and resolution
Week 7	Mid Exam, Mealy machine Design.
Week 8	Moore. Machine Design.
Week 9	ASM charts. & the Principle components of an ASM chart
Week 10	Conversion of a state diagram to ASM chart.

Week 11	CMOS, TTL, ECL. & Prorogation delay. & Switching speed limitations and Power dissipation.
Week 12	PLD advantages. & ROM as PLD. & PLA and PAL. & SPLD. & CPLD.
Week 13	FPGA. & GAL. HAL.
Week 14	The main features to VHDL. Design Units. & Structural modeling
Week 15	Data flow modeling. & Behavioral modeling. & Mixed style of modeling.
Week 16	Final exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Digital Design** **Author : Morris Mano** **Edition & Year Public: Prentice Hall, 4 thEd., 2006**	Yes
Recommended Texts	"Digital Design: Principles and Practices" by John F. Wakerly	Yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Object Oriented Programming (OOP)			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	OBOP 2104				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	NE		**College**	Type College Code	
Module Leader	Sura Nasser Maryoush		**e-mail**	Suranasser16@yahoo.com	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	MSC	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Programming I	**Semester**	Level 1 /2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop programming skills and understanding of advanced concepts of programming. 2. To implementing programs by using classes and objects 3. To understand the concepts of object oriented programming 4. To be able to increase the effeciency of the programs by using OOP concepts 5. To be able to decrease the number of code lines by using the concept on inheritance 6. Create functions and classes that can deal with different data types with the same code by using templates. 7. To handle exceptions dealing with streams and files. 8. To understand the concept and the types of data structures
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Creating simple programs using classes and objects in C++ 2. Understand dynamic memory management techniques using pointers, constructors, and destructors 3. Implementing object oriented programmming concepts in C++ 4. Understanding and implementing the concept of the friend functions and friend classes in C++ programs. 5. Classify inheritance with the understanding of early and late binding. 6. Describe the concepts of operator overloading , virtual functions and polymorphism. 7. Implementing programs using templates and handling exceptions in C++ 8. Develop applications using stream I/O and file I/O. 9. Understand the data structure types and concepts
Indicative Contents المحتويات الإرشادية	This module will focus on advance topics in programming, specially on object oriented programming concepts , and other concepts as the followings: • Introducing the concept of Pointers, pointer to pointers , arrary of pointer , pointer to array • Structures, structure within structure, union, enumerations • OOP concepts and related topics: classes , objects, constructors, destructors, scope resolution operator , static and constant memebers, friend functions and classes, inheritance, method overriding, virtual function and polymorphism, operator overloading, templates, exceptions. • Streams and files • Standard Template Library (STL) • Data structures: stack , linked list, queue, trees, graphs

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and programming skills. This will be achieved through classes, interactive discussions and by considering types of simple practical implementing of codes and programs: • Theory based lectures: the traditional classroom lectures are used to presents programming topics, concepts, methods, which will be explained by examples, also, the students will be engaged in discussions to foster understandings . • Laboratary experiments: in the laboratary session, the students will be able to use the available softwares to write and implement codes and programs to solve different problems, and gain programming and problem solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2,#3 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	12	LO #5, #6 and #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review of C++ basics, pointers, pointer arithmetic, array of pointers, pointer to pointer, passing pointer to a function
Week 2	Structures, array of structures, structure within structure, unions, enumeration
Week 3	Introduction to OOP, OOP concepts, Classes, objects.
Week 4	Constructor, member initialization list, constructor overloading, destructor, scope resolution operator, constant and static members
Week 5	Friend function and friend class
Week 6	Inheritance concept, types of Inheritance, single Inheritance, multiple Inheritance, multilevel Inheritance, heirarchical Inheritance, hybrid Inheritance.
Week 7	Mid term + Access control and Inheritance, overriding methods, polymorphism and virtual functions
Week 8	Operator overloading, overloading unary operators , overloading binary operators
Week 9	Templates, function templates, class templates
Week 10	Errors and Exceptions.
Week 11	Standard Template Library (STL), containers, algorithms, iterators
Week 12	Streams, stream classes, predefined stream objects, stream errors, error status bits
Week 13	Disk file I/O with streams, formatted I/O files, writing data, reading data, detecting the end of file and closing files
Week 14	Introuction to data structures, linked list, stack
Week 15	Queue , trees, graphs
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to codeblocks, pointers
Week 2	Lab 2: array of structures, structure within structure
Week 3	Lab 3: C++ programs with classes and objects
Week 4	Lab 4: classes with overloaded constructors, and destructor
Week 5	Lab 5: friend class and friend functions
Week 6	Lab 6: inheritance
Week 7	Lab 7: method overriding
Week 8	Lab 8: operator overloading

Weak 9	Lab 9: templates
Weak 10	Lab 10: Exceptions
Week 11	Lab 11:STL algorithms
Week 12	Lab 12: streams
Week 13	Lab 13: files I/O
Week 14	Lab 14: stack, linked lists
Week 15	Lab 15: queue

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or ISBN-13: 978-0321714114 • Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13: 978-0321563842 (advanced)	Yes
Recommended Texts	Robert Lafore, Object-Oriented Programming in C++ , Sams Publishing, 4th Edition,	No
Websites	www.cpptutorial.com	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Human Rights			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	HURI 2106				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	3	
Administering Department	NE		**College**	Type College Code	
Module Leader	Dr. Ammar Mezlla Shanta		**e-mail**	E-mail : ammaralhatem@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail : ammaralhatem@aliraqia.edu.iq	
Peer Reviewer Name			**e-mail**	E-mail :	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- التعرف على منهجية حقوق الانسان وما اقره الاعلان العالمي لخقوق الانسان 2- التعرف بان حقوق الانسان حقوق عالمية متأصله لجميع البشر مهما كانت جنسيتهم او نوعهم الاجتماعي او اصولهم الوطني او العرقي او لونهم او لغتهم 3- التعرف على اهمية الحقوق والواجبات المتصلة بحقوق الانسان والمواطنة 4- تعرف الطالب على حقوقه وواجباته كطالب او كمواطن 5- التعرف على المفاهيم والمبادئ الاساسية لحقوق الانسان
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-اكتساب الطالب معرفة المفاهيم الاساسية لحقوق الانسان وتطبيقها من خلال الأمثلة 2-معرفة الحقوق والواجبات والمواطنة 3-دراسة الطالب مواضيع تكسبه المهارات المجتمعية في التعامل 4-يستطيع الطالب من خلال معرفة حقوقه وواجباته التغلب على المشاكل المجتمعية 5- تكليف الطلبة بكتابة البحوث والتقارير لاختبار مدى استيعابهم لحقوقهم وواجباتهم
Indicative Contents المحتويات الإرشادية	1- ارشاد الطلبة إلى تكوين خزين معرفي لحقوقهم وواجباتهم الاساسية داحل وخارج البلاد 2- اكتساب الطلبة المهارات الاساسية فيما يخص الحقوق والواجبات 3-تعرف الطالب على النصوص والقوانين التاريخية والمعاصرة فيما يخص حقوق الانسان 4-اكتساب الطلبة ثقافة عامة تمنحهم الخبرة والمعرفة

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1-القاء المحاضرات النظرية بشكل افتراضي ومباشر 2-عمل بحوث وتوزيعها على مجاميع طلابية لمعرفة فهمهم للمادة او ادراكهم لها والتطلع لكسب ثقافات اخرى 3-اشراك ومشاركة الطالب في الحوار فيما يخص موضوع المحاضرة 4- من الطرائق الناجعة هي استراتيجية مهارات التفكير ضمن مجموعة 5-من اهم طرائق التعلم والتعليم الاذكاء والعصف الذهني للطالب

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	1,5	LO #1, and 5
	Report	1	20% (20)	13	LO # 2,3,4, and 5
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-3
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	مقدمة عن حقوق الانسان/مدخل عام الى مفهوم حقوق الانسان
Week 2	فئات (انواع حقوق الانسان)
Week 3	حقوق الانسان في الحضارات القديمة والشرائع السماوية
Week 4	حقوق الانسان في حضارة وادي الرافدين
Week 5	حقوق الانسان في الاسلام
Week 6	تطورفكرة حماية حقوق الانسان في العصر الحديث
Week 7	المجتمع الدولي وحقوق الانسان المعاصر
Week 8	واجبات الانسان والبنود الواردة على ممارسة حقوق الانسان
Week 9	امتحان مد
Week 10	التعرف على اهمية معالجات وانعكاسات الفساد الاداري
Week 11	تمكين وحقوق المرأة
Week 12	التعرف على المنظمات والهيأة الدولية المعنية بالدفاع عن حقوق الانسان
Week 13	اخلاقيات المهنة
Week 14	قانون ضبط الطلبة في مؤسسات وزارة التعليم العالي والبحث العلمي
Week 15	مراجعة للطلاب قبل الامتحان النهائي
Week 16	الاختبارات النهائية

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	-الكتاب المنهجي في الكلية -المواثيق الدولية لحقوق الانسان	Yes
Recommended Texts	-الاعلان العالمي لحقوق الانسان 1948بموجب قرار الهيئة العامة للامم المتحدة المؤرخ في 10 كانون الاول ديسمبر عام 1948 الملاحق-الديباجة –المواد	No
Websites	1. https://g.co/kgs/p8YcVm	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جدا	80 – 89	Above average with some errors
	C - Good	جيد	70 – 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Advance Mathematics I**			**Module Delivery**	
Module Type	B			☐**Theory** ☒ **Lecture** ☐**Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ADMA 3101				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Networks engineering		**College**	College of engineering	
Module Leader			**e-mail**	@aliraqia.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics IV	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding Basic Probability Concepts: The primary aim is to help students understand the fundamental principles of probability. This includes the interpretation of probability, random variables, probability mass/density functions, cumulative distribution functions, expected values, variance, and other basic concepts. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 2. Probability Distributions: Engineers should understand various discrete and continuous probability distributions, their properties, and how they can be used to model various phenomena. Examples include Binomial, Poisson, Uniform, Normal, Exponential, and Gamma distributions. Reading plans of projects . 3. Modeling Uncertainty: One of the primary uses of probability in engineering is to model uncertainty. This includes understanding how to model random phenomena, from simple things like coin flips to complex systems with many interacting parts. Auto desk AutoCAD software provide powerful ,integrated 2D modeling, drawing ,and layers tools that enable designers to focus more energy on creative ,rather than technical challenges 4. Stochastic Processes: For time-dependent or sequence-dependent phenomena, understanding stochastic processes such as Markov chains, Poisson processes, and queuing theory can be crucial. 5. Problem-Solving Skills: Lastly, a core aim is to develop problem-solving skills, i.e., the ability to apply theoretical knowledge to practical problems, an essential trait for any engineer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Sample space: a. Understand the concept of a sample space in probability theory. b. Define sample points and events within a sample space. 2. Events: a. Define events as subsets of a sample space. b. Determine the union, intersection, and complement of events. c. Apply set operations to analyze events. 3. Experiment: a. Define an experiment as a process that generates outcomes. b. Identify different types of experiments and their characteristics. 4. Basic counting principles: a. Understand the principles of permutation and combination. b. Apply these principles to count the number of possible outcomes. 5. Frequency distribution: a. Define frequency distribution and frequency table. b. Construct frequency tables and interpret them. 6. Cumulative frequency and histogram: a. Define cumulative frequency and construct cumulative frequency tables.

	b. Create histograms to visualize data distributions. 7. Measures of tendency: • Calculate and interpret measures of central tendency, including mean, median, and mode. 8. Measures of dispersion: • Calculate and interpret measures of dispersion, such as range, average deviation, variance, and standard deviation. 9. Probability: a. Understand the concept of probability and its applications. b. Apply elementary probability rules to solve probability problems. c. Calculate conditional probability and understand its significance. 10. Probability distribution functions: a. Understand the concepts of discrete and continuous random variables. b. Define probability distribution functions for both types of variables. c. Calculate expected values and variances for probability distributions. 11. Distributions: a. Study specific probability distributions, such as the binomial distribution and normal distribution. b. Understand their characteristics, properties, and applications. 12. Joint probability distribution function: a. Define joint probability distribution functions for multiple variables. b. Understand marginal functions and their relationship to joint distributions. c. Analyze independence, expected values, covariance, and correlation between variables.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to probability and statistics. 2. Basic counting principles: permutation and Combination . 3. Frequency distribution. 4. Measures of Tendency. 5. Measures of dispersion. 6. Elementary probability and Conditional probability . 7. Probability distribution Functions. 8. Expected and variance. 9. Distributions. 10. Joint probability distribution Function. 11. Expected, covariance, correlation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Emphasize the underlying concepts and principles of probability and statistics rather than focusing solely on calculations and formulas. Help students grasp the fundamental ideas behind probability, statistical inference, and data analysis to build a solid.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	3 , 7 and 12	LO #5 , #6, #9 and #11
	Assignments	2	15% (15)	1 and 5	LO #1 , #2 , #3, #4 and #8
	Report	1	10% (10)	13 and 14	LO # 12
Summative assessment	**Midterm Exam**	2hr	10% (10)	9	LO #1 - #9
	Final Exam	3hr	50% (50)	14	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to probability and statistics Sample space Events Experiment Basic counting principles: permutation
Week 2	Combination Mixed between permutation and combination
Week 3	Frequency distribution Frequency table Cumulative frequency Histogram O-gives
Week 4	Measures of Tendency Mean Median Mode
Week 5	Measures of dispersion Range Average deviation Variance
Week 6	Measures of dispersion Variance Standard deviation
Week 7	Probability Elementary probability
Week 8	Probability Conditional probability
Week 9	Mid exam
Week 10	Probability distribution Functions Discrete and continuous variables Probability distribution Function
Week 11	Expected and variance
Week 12	Distributions Binomial distribution Normal distribution
Week 13	Joint probability distribution Function Marginal Functions Independent variables
Week 14	Expected, covariance
Week 15	correlation
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Probability and statistics for engineering and scientists By : Walpole and Myers	yes
Recommended Texts	1. Probability and statistics for engineers By : Miller and Freund's 2. Applied mathematics journals, schaum series in Probability and statistics	no
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Image Processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**IMPR 3105**				
ECTS Credits	6				
SWL (hr/sem)	**150**				
Module Level	**UGIII**		**Semester of Delivery**	**Five**	
Administering Department	Network		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Image enhancement techniques are used to improve the visual quality of images by reducing noise, increasing contrast, sharpening edges, and adjusting brightness and color levels 2. Image restoration techniques are employed to recover images that have been degraded or corrupted by various factors such as noise, blur, or compression artifacts. 3. Image compression techniques aim to reduce the size of digital images while minimizing the loss of important visual information. 4. Image segmentation involves dividing an image into meaningful regions or objects based on their characteristics, such as color, texture, or shape. 5. Image processing allows for the extraction of relevant features or patterns from images, which can be used for further analysis or as input to machine learning algorithms.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Digital Imaging Principles: Image processing involves the manipulation and analysis of digital images. 2. Proficient in applying for image enhancement, restoration, compression, segmentation, and object recognition techniques to solve various image processing problems and tasks. 3. Programming and Algorithmic Skills: Image processing often requires implementing algorithms and techniques using programming languages such as MATLAB program. 4. Application of Image Processing in Various Fields: Image processing has applications in diverse fields, including computer vision, medical imaging, remote sensing, robotics, and more. 5. Image processing enhances visual literacy by training the interpret, analyze, and extract information from images.
Indicative Contents المحتويات الإرشادية	1. Introduction to Digital Image Processing: • Basics of digital imaging: pixels, color channels, image resolution, and bit depth. • Image representation and storage: grayscale and color images, image file formats. 2. Image Enhancement: • Histogram equalization: contrast stretching, histogram specification, and matching. • Spatial domain techniques: point operations, intensity transformations, and image arithmetic. • Frequency domain techniques: Fourier transform, filtering, and image restoration. 3. Image Restoration and Reconstruction: • Image degradation: noise models, blurring, and geometric distortions.

	• Noise removal techniques: spatial filtering, linear and nonlinear filtering, median filtering. • Image reconstruction from projections: tomographic reconstruction. 4. Image Compression: • Lossless compression: Huffman coding, run-length encoding, and predictive coding. • Lossy compression: transform-based methods, quantization, and entropy coding. 5. Image Segmentation: • Thresholding techniques: global and adaptive thresholding, multiple thresholding. • Region-based segmentation: region growing, region splitting and merging, and watershed segmentation. • Edge-based segmentation: edge detection, gradient operators, and edge linking. • Object Recognition and Classification. 6. Morphological Image Processing: • Morphological operations: dilation, erosion, opening, and closing. 7. Color Image Processing

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategies will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. ● Theory-Based Lectures: Traditional classroom lectures are used to present theoretical concepts, principles, and theories related to electrical engineering. Professors or instructors explain complex ideas, provide examples, and engage students in discussions to foster understanding. ● Laboratory Experiments: Laboratory sessions are an integral part of electrical engineering education. Students engage in hands-on experiments, using equipment, instruments, and software tools to apply theoretical knowledge, analyze data, and gain practical skills. This helps them understand the practical aspects of electrical engineering and reinforces theoretical concepts.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	97
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1 and 2
	Assignments	3	10% (10)	2, 8, 12	LO # 3
	Projects / Lab.	3	10% (10)	3, 6, 9	LO # 1,2, and 3
	Report	2	10% (10)	4, 9	LO # 3 and 4
Summative assessment	**Midterm Exam**	2 hours	10% (10)	6,11	LO # 1-5
	Final Exam	3 hours	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Fundamental Steps in Digital Image Processing. • Components Of an Image Processing System. • Image Sensing and Acquisition.
Week 2	• Image Sampling and Quantization. • Some Basic Relationships Between Pixels.
Week 3	• Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.
Week 4	• Spatial Domain methods: Basic grey level transformation – Histogram equalization.
Week 5	• Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters.
Week 6	• Filtering In the Frequency Domain, Mid-Exam.
Week 7	• Image Restoration: Model of Image Degradation/restoration process – Noise models.
Week 8	• IMAGE SEGMENTATION AND REPRESENTATION: Edge detection – Thresholding - Region Based segmentation
Week 9	• Morphological Image Processing: Dilation, Erosion.
Week 10	• Morphological Image Processing: Opening, And Closing.
Week 11	• Color Image Processing
Week 12	• IMAGE COMPRESSION: Lossless compression: Variable length coding, LZW coding
Week 13	• Computer vision applications: Autonomous vehicles, augmented reality, and surveillance systems.
Week 14	• Applications of artificial intelligence in image processing.
Week 15	• Seminars (Student Work).
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Introduction to Laboratory Simulation Programs.
Week 2	• Representing Images In MATLAB.
Week 3	• Image Intensity and Spatial Resolution.
Week 4	• Arithmetic Operation.
Week 5	• Logic Operation.
Week 6	• Mid-Exam, Logic Application Algorithms.
Week 7	• Intensity Transformation.
Week 8	• Hisotgram.

Week 9	● Noise & Spatail Filter.
Week 10	● Frequency Domain.
Week 11	● Mid-Exam, Filters.
Week 12	● Haar Wavelet transform “1-D”.
Week 13	● Haar Wavelet transform “2-D”.
Week 14	● RGB to Lab Transformation.
Week 15	● Review and revision.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Digital Image Processing, Rafael C. Gonzalez Third Edition	Yes
Recommended Texts	Color Image Processing and Applications, K.N. Plataniotis and A.N. Venetsanopoulos, 2000	No

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Microprocessor			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MICR 3102				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	NE		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer architecture	**Semester**	Level 2/2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To become familiar with the architecture and pins configuration of 8086 µP. 2. to understand the main differences between maximum and minimum modes of bus cycle 3. to understand the different addressing modes. 4. to provide practical hands on experience with assemby language programming 5. develop and test assembly language programs 6. get familiarize with interfacing of various peripheral devices with 8086 µP using 8255A chip 7. to understand the concepts of interfacing with LEDs, DC motor, and analog to digital converter or digital to analog converter,
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the arhitecture and organization of 8086 µP. 2. Illustrate the pins configuration of 8086 µP. 3. Distinguish between the minimum and maximum mode of Bus cycle. 4. Understand and classify the instructions of 8086 µP and distinguish the use of different instructions and apply it in assembly language programming 5. Be able to write efficient assembly language programs and develop programming skills. 6. Relate the addressing modes used in the instructions. 7. Realize the interfacing of memory and various I/O devices with 8086 µP. 8. Familirarise the architecture and operation of programmable interface devices and realize the programming and interfacing with 8086 µP. 9. Interface various peripheral IC's with 8086 µP for different applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. This module topics can by divided to three main parts as the following: <u>Part A : 8086 Microprocessor</u> Registers, flags, Architecture and Pin-configuration, Minimum-Mode and Maximum-Mode System, Minimum-Mode Interface Signals, Maximum-Mode Interface, System Clock, Bus Cycle and Time States, Basic Memory Operations for 8086 µP, Software Model of 8086µP, Physical Address Generation, Addressing Modes of 8086µP, Unsigned and Signed Integer Numbers. <u>Part B: Assembly language instructions</u> Instruction Set of 8086µP, Data Transfer Instructions, Addition and Subtraction Instructions, Multiplication and Division Instructions,CBW & CWD instructions, Logical Instructions, Shift Instructions, Rotate (ROL, ROR, RCL, and, RCR) Instructions, Flags Control Instructions, Compare CMP and TEST Instructions, The TEST Instruction, Branch Instructions (Jump), Unconditional and Conditional Jump.

	Part C : interfacing Interfacing of 8086, The 8086 µP and memory or I/O interfaces relationship, Programmable Peripheral Interface 8255A, Read/Write and Control Logic, Group A and Group B Controls, Ports A, B, and C, Delay in Programs, Software Delays, Interfacing 8-bit Peripherals to 16-bit µP, Interfacing with LEDS, traffic lights, Interfacing with DC motor,Analog to Digital Converter (ADC) and Digital to Analog convertor (DAC).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and programming skills using assembly language. This will be achieved through classes, interactive discussions and by considering types of simple practical implementing of codes and programs: • Theory based lectures: the traditional classroom lectures are used to presents topics, concepts of 8086 µP, and assembly instructions, which will be explained by examples, also, the students will be engaged in discussions to foster understandings . • Laboratary experiments: in the laboratary session, the students will be able to use the available simulation softwares and tools to write and implement ALP to solve different problems and prgramming interfaces of I/O devices, and gain problem solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.08
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2, #3 and #4, #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #7, #8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8, and #9
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to 8086 microprocessor , registers, flags.
Week 2	The 8086/8088Microprocessor Architecture and Pin-configuration, Minimum-Mode and Maximum-Mode System, Minimum-Mode Interface Signals, Maximum-Mode Interface,
Week 3	System Clock, Bus Cycle and Time States, Two Basic Memory Operations for 8086 µP
Week 4	Software Model of 8086µP, Physical Address Generation, Addressing Modes of 8086µP, Unsigned and Signed Integer Numbers
Week 5	Instruction Set of 8086µP, Data Transfer Instructions, Addition and Subtraction Instructions, Multiplication and Division Instructions
Week 6	CBW & CWD instructions, Logical Instructions, Shift Instructions, Rotate (ROL, ROR, RCL, and, RCR) Instructions
Week 7	Mid exam + Flags Control Instructions, Compare CMP and TEST Instructions, The TEST Instruction
Week 8	Branch Instructions (Jump), Unconditional and Conditional Jump
Week 9	Interfacing of 8086, The 8086 microprocessors and memory or I/O interfaces relationship,
Week 10	Programmable Peripheral Interface 8255A, Read/Write and Control Logic, Group A and Group B Controls, Ports A, B, and C
Week 11	Delay in Programs, Software Delays.
Week 12	Interfacing 8-bit Peripherals to 16-bit Microprocessor
Week 13	Interfacing with LEDS, traffic lights
Week 14	Interfacing with DC motor
Week 15	Analog to Digital Converter (ADC) and Digital to Analog convertor (DAC)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introduction to emulator 8086 application, simple ALP to copy the values of the registers
Week 2	Lab 2: ALP to perform addition and subtraction instructions on register contents .
Week 3	Lab 3: ALP to Increament or decreament the values that stored in the block of memory locations
Week 4	Lab 4: ALP to store ODD or EVEN numbers in the block of memory locations
Week 5	Lab 5: ALP to add the values of two blocks of memory locations and store the result in a third block of memory locations
Week 6	Lab 6: ALP to perform division and multiplication instructions
Week 7	Lab 7: ALP program to find the Average of numbers stored in the memory locations
Week 8	Lab 8: ALP to arrange the series of numbers stored in the memory locations in ascending and descending order
Week 9	Lab 9: ALP to count Positive and/or Negative numbers
Week 10	Lab 10: ALP to store a series of numbers in the memory by using Microprocessor trainer Kit
Week 11	Lab 11: ALP to Display text on LCD screen
Week 12	Lab 12: ALP for LEDS lighting
Week 13	Lab 13: ALP for LEDS lighting with delay
Week 14	Lab 14: ALP to control the direction of rotation of the DC motor , with timer
Weak 15	Lab 15: DAC and ADC ALP

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• The x86 microprocessors, Lyla B. Das, 2nd edition, pearson	No
Recommended Texts	“Microprocessors and peripheral ICs”, S.K. San,	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A –** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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	Ministry Of Higher Education & Scientific Research Al-Iraqia University College of Engineering Networks Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	OPTICAL COMMUNICATION			**Module Delivery**	
Module Type	**CORE**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	OPCO 3103				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Network Engineering		**College**	Engineering	
Module Leader	Samar Kareem Ibrahim		**e-mail**	Samar.kareem90@gmail.com	
Module Leader's Acad. Title	ASST. LECTURER		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

<table>
<tr><th colspan="4">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>Communication ||</td><td>Semester</td><td>Four</td></tr>
<tr><td>Co-requisites module</td><td>Optical Network</td><td>Semester</td><td>Eight</td></tr>
<tr><th colspan="4">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td colspan="3">1. Introduction:
• Introduce students to the field of optical communication, its historical development, and its importance in modern communication systems.
• Provide an overview of the basic principles and components of optical communication systems.
2. Optical Fiber Structures and Light Guiding Principles:
• Familiarize students with different types of optical fibers and their structures.
• Explain the principles of light propagation and guiding in optical fibers, including total internal reflection and modes of propagation.
3. Optical Signal Attenuation and Dispersion:
• Explore the causes and effects of signal attenuation in optical fibers, such as absorption and scattering.
• Discuss the phenomenon of dispersion and its impact on signal quality and transmission distance.
4. Light Sources for Fiber Links:
• Introduce different types of light sources used in optical communication systems, such as light-emitting diodes (LEDs) and laser diodes.
• Discuss the characteristics, performance parameters, and modulation techniques associated with light sources.
5. Optical Power Coupling:
• Explain the process of coupling optical power into and out of optical fibers.
• Discuss techniques and devices used for efficient power coupling, such as connectors, splices, and couplers.
6. Photodetection Devices:
• Introduce photodetection devices used in optical receivers, such as photodiodes.
• Discuss their operating principles, performance parameters, and noise considerations.
7. Optical Receiver Operation:
• Explain the operation and components of optical receivers, including photodetection devices, amplifiers, and signal processing circuits.
• Discuss various receiver architectures and their performance characteristics</td></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td colspan="3">1. Explain the basic principles and components of optical communication systems.
2. Describe different types of optical fibers and their structures.
3. Understand light propagation and guiding in optical fibers.
4. Identify causes and effects of signal attenuation and dispersion in optical</td></tr>
</table>

	fibers. 5. Recognize different types of light sources used in optical communication systems. 6. Understand their operating principles and modulation techniques. 7. Understand the process of coupling optical power into and out of fibers. 8. Understand the operating principles and performance parameters of photodetection devices. 9. Describe the components and operation of optical receivers. 10. Analyze receiver architectures and optimize performance parameters.

Indicative Contents المحتويات الإرشادية	1. Introduction 2. Optical fiber structures and light guiding principles 3. Optical signal attenuation and dispersion 4. Light sources for fiber links 5. Optical power coupling 6. Photodetection devices 7. Optical receiver operation
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional classroom lectures can be used to present theoretical concepts, principles, and fundamental knowledge related to optical communication. This can include explanations of key concepts, demonstrations, and the use of visual aids to enhance understanding. 2. Simulations and Modeling: Using software tools or simulations specifically designed for optical communication can help students understand system performance, analyze signal propagation, and evaluate various system parameters. This allows them to gain insights into the behavior and optimization of optical communication systems. 3. Assessments and Feedback: Regular assessments, quizzes, and assignments can assess students' understanding of the subject matter. Providing constructive feedback helps students identify areas for improvement and reinforces their learning.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3 - 12	LO #2 - 7
	Assignments	2	10% (10)	5 – 10	LO # 1 - 8
	Laboratory	1	10% (10)	Continuous	
	Midterm Exam	1 hr	20% (20)	9	LO # 1- 5

Summative assessment	**Final Exam**	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**1 INTRODUCTION** 1.1 Historical development 1.2 The general system 1.3 Advantages of optical fiber communication
Week 2	**2 OPTICAL FIBER STRUCTURES AND LIGHT GUIDING PRINCIPLES** 2.1 The Nature of Light 2.2 Basic Laws and Definitions of Optics
Week 3	2.3 Optical Fiber Configurations and Modes 2.4 Modes in Circular Waveguides
Week 4	2.5 Single-Mode Fibers 2.6 Graded-Index (GI) Fibers
Week 5	2.7 Optical Fiber Materials 2.8 Photonic Crystal Fiber Concepts 2.9 Optical Fiber Cables
Week 6	**3 OPTICAL SIGNAL ATTENUATION AND DISPERSION** 3.1 Fiber Attenuation
Week 7	3.2 Optical Signal Dispersion Effects
Week 8	3.3 Design and Characteristics of SMFs
Week 9	**4 LIGHT SOURCES FOR FIBER LINKS** 4.1 Basic Concepts of Semiconductor Physics 4.2 Principles of Light-Emitting Diodes (LEDs)
Week 10	4.3 Principles of Laser Diodes 4.4 Output Linearity of Light Sources
Week 11	**5 OPTICAL POWER COUPLING** 5.1 Source-to-Fiber Power Coupling 5.2 Coupling Improvement with Lensing Schemes

Week 12	5.3 Losses Between Fiber Joints **6 PHOTODETECTION DEVICES** 6.1 Operation of Photodiodes
Week 13	6.2 Noise Effects in Photodetectors 6.3 Response Times of Photodiodes
Week 14	**7 OPTICAL RECEIVER OPERATION** 7.1 Basic Receiver Operation 7.2 Performance Characteristics of Digital Receivers
Week 15	7.3 Principles of Eye Diagrams 7.4 Burst-Mode Receivers 7.5 Characteristics of Analog Receivers
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: To design a basic optical fiber communication system using OptiSystem software
Week 2	Lab 2: Study and plot the different characteristics of an optocoupler device.
Week 3	Lab 3: Observe the effect of noise and dispersion on eye pattern in a communication system.
Week 4	Lab 4: Measure insertion loss, reflectance, total loss, attenuation coefficient and fiber break location using OTDR.
Week 5	Lab 5: Generate an intensity-modulated signal at the transmitter and demodulate it at the receiver using a direct detection scheme in OptiSystem software.
Week 6	Lab 6: Modulate a continuous wave laser using an external PRBS generator and analyze the BER, Q-factor, and eye diagram obtained at the output.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Gerd Keiser, "Fiber Optic Communications", Springer Nature Singapore Pte Ltd. 2021	
Recommended Texts	John M. Senior, "Optical Fiber Communications Principles and Practice", 3rd Edition, Pearson Education Limited 2009	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Network Operating System**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐**Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NEOS 3106				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	Network Engineering Department		**College**	Collage of Engineering	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	At the end of the course the student knows the main technical problems and the related solution behind networking with reference to the Internet. The student can understand the functional principles of a network service and the related quality of service issues as well as the Internet protocol architecture and the main protocols. The student knows how to implement some basic network applications and can analyze protocol behavior, also, the learner should be able to: 1. Understand the concepts of Network Operating Systems – NOS 2. be able to identify and use main technologies related to the implementation of NOS components and comprehend related issues and new trends of the subject. 3. know basic components of an operating system. 4. comprehend how an operating system virtualizes CPU and memory. 5. discuss various scheduling and swapping policies. 6. explain how a simple file system organizes data in the hard disk.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Intended Learning Outcomes: 1. Understanding basic concepts of N.O.S and the server. 2. Identifying and using main technologies of N.O.S and related hardware. 3. Accommodating related issues of NOS and its new trends. 4. To provide a comprehensive understanding of network operating systems, including its principles, characteristics, and waveform. 5. To provide users a convenient interface to use the computer system. 6. To act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources 7. To manage the resources of a computer system. 8. To make the computer system convenient to use in an efficient manner. 9. To hide the details of the hardware resources from the users.
Indicative Contents المحتويات الإرشادية	The student will learn the basic and applied concepts of Network Operating system Engineering with the following fundamentals: 1. Introduction to Network Operating Systems. 2. Network Infrastructure. 3. Network Services and Protocols. 4. Network Administration and Management. 5. Network Security. 6. Network Backup and Recovery. 7. Network Virtualization. 8. Network Storage and Data Management. 9. Cloud Computing and Network Operating Systems. 10. Emerging Trends in Network Operating Systems.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Flip class 3. Assignment and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** 1. Defining Network Operating Systems 2. Types of NOSs 3. Characteristics Of NOSs 4. Components of NOSs 5. Usual working scenarios with NOSs 6. Unusual working scenarios for NOS 7. System Documentation
Week 2	**Distributed Systems** 1. Defining Distributed systems 2. Type of Network – Base Operating Systems 3. Network Structure (LAN – WAN) 4. Communication Structure
Week 3	**Processes & threads** 1. Process Concept 2. Process Scheduling 3. Operations on Processes 4. Process and Threads 5. types of Threads 6. Multithreading Models
Week 4	**Preparing Working Environment and Installing Server** 1. Preparing Working Environment 2. Installation Process 3. Installing Server Hardware 4. SCSI Technique
Week 5	RAID 1. Introduction 2. Basic Concepts of RAID 3. RAID Levels 4. Handling RAID Errors
Week 6	**Networking Environment for OS** 1. Basic Principles of Computer Networks 2. Networks Typology 3. Layering Structure 4. Most Used Standards & Protocols
Week 7	**Midterm + Resource allocation& deadlock** 1. Resource Allocation Graph (RAG). 2. The Deadlock Problem

	3. System Model 4. Deadlock Characterization 5. Methods for Handling Deadlocks 6. Deadlock Prevention 7. Deadlock Avoidance 8. Deadlock Detection 9. Recovery from Deadlock
Week 8	**Storage Area Networks – SANs** 1. Network Storing Techniques 2. Network Area Storage – SAN 3. Fiber Channel Protocol – FCP 4. SAN over IP
Week 9	**Network Systems Security** 1. Strategies of Building Secure Systems 2. Firewalls 3. OS Protection & Security 4. Intruders 5. Trusted Systems 6. Security in Distributed systems
Week 10	**Processes and Process Synchronization models** 1. Interposes communications. 2. Peterson solution
Week 11	**Massage – and stream – Oriented communication** 1. What is message and stream-oriented communication? 2. What is the difference between message and stream communication? 3. What are the different types of message-oriented communication?
Week 12	**I/O SYSTEMS** 1. I/O Hardware 2. I/O port 3. I/O Devices 4. Polling 5. Interrupts 6. DMA 7. Buffering 8. Cashing 9. Spooling
Week 13	**Distributed Middleware** Common Object Request Broker Architecture (CORABA)
Week 14	**Memory management** 1. Process Address Space (Symbolic addresses, Relative addresses, Physical addresses). 2. Static vs Dynamic Loading

	3. Static vs Dynamic Linking 4. Swapping 5. Memory Allocation 6. Fragmentation (External fragmentation, Internal fragmentation). 7. Paging 8. Segmentation
Week 15	**Backups** 1. Data Repository 2. Storage Media 3. Selection & Extraction of Data 4. Backups Planning 5. Backups Solutions Using iSCSI Protocol in Backups
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free.	Yes
Recommended Texts	Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commons BY-NC-SA.	Yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Signals and Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	SISY 3104				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		UGIII	**Semester of Delivery**		Five
Administering Department		Network Engineering	**College**	College of Engineering	
Module Leader	Ahmed Sabah Noori		**e-mail**	asabah22@gmail.com	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• To develop the understanding of the basic ideas of the Signals & Systems encountered in engineering. • To understand the methods for characterizing and analyzing continuous-time signals and systems. • To learn the transform techniques (Fourier transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, Digital signal processing and Digital image processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Express the concepts of signals and systems and their different types which can be used in a wide variety of disciplines in engineering. 2. Identify and report system properties such as causality, stability, linearity, and time invariance etc. 3. Apply the convolution integral formulas to determine the output of continuous time systems. 4. Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms. 5. Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain. 6. Understand the concept of filters and their design.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Basic signals of continuous time. • Signals and Their Classification - Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals. • Properties of continuous time systems. • Linear, time invariant (LTI) systems. • Operations on Signals • Signal convolution - integral formula • Representation of periodic signals as Fourier series. • Continuous time Fourier transform. • Analysis of LTI systems in the field of time and frequency. • The Fourier Transform - Introduction • Properties of Continuous time Fourier Transform • Finite impulse response (FIR) Filter analysis and design • Infinite impulse response (IIR) Filter analysis and design • Butterworth Analog Filters • Cheby-Chev Analog Filters

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1, #2 and #4, #5
	Assignments	2	5% (5)	2 and 12	LO #3, #4 and #5, #6
Summative assessment	**Midterm Exam**	2hr	30% (30)	8	LO #1 - #3
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts of Signals & Systems - Introduction
Week 2	Signals Classification
Week 3	Signals Operations & transformations
Week 4	Classification of Systems - Interconnections of Systems

Week 5	Linear Time Invariant Systems - Introduction
Week 6	Properties of Continuous Time LTI System
Week 7	Signal convolution method - integral formula
Week 8	**Mid-term Exam,** Signal convolution
Week 9	The Fourier Transform
Week 10	Properties of Continuous time Fourier Transform
Week 11	Laplace Transformation
Week 12	Filter Analysis and design (FIR & IIR)
Week 13	Butterworth Analog Filters
Week 14	Chebychev Analog Filters
Week 15	Analog Filters Examples
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Alan V. Oppenheim, Signals & Systems 2nd Edition, Pearson Education, 2008.	Yes
Recommended Texts	Signals and Systems, Simon Haykin and Barry Van Veen, 2nd edition, Wiley 2005.	yes
Websites	https://www.coursera.org/learn/ signals and systems fundamentals	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Machine Learning**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MALE 4104**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		1	**Semester of Delivery**		1
Administering Department		NE	**College**	Type College Code	
Module Leader	Dr. Omar Hussein Salman		**e-mail**	Omar.salman@aliraqia.edu.iq	
Module Leader's Acad. Title		Assoc. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Miss Zahraa Khdair Taha		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Advance Mathematics ||	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course will enable the students to: 1. understand the fundamental concepts underlying machine learning algorithms. 2. understand the fundamental issues involved with machine learning, including data, model selection, and model complexity. 3. master the art of implementing sophisticated machine learning models in order to solve real problems. 4. be able to choose the most appropriate model for a particular task and evaluate its performance. 5. develop skills in applying recent machine learning tools to solve practical problems. analyze the challenges posed by modern data and how machine learning can resolve them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. explain the concept and mathematical models of machine learning. 2. explain data processing and feature extraction techniques. 3. Understand the basic concept of neural network algorithms. 4. evaluate various classification algorithms including Bayesian, Nearest-Neighbor, Logistic Regression, Polynomial and Decision Tree 5. evaluate different regression algorithms including Nearest-Neighbor, Linear Regression, Support Vector Regression and Regression Trees 6. examine various unsupervised learning algorithms including clustering and association. 7. apply the feature engineering models including feature construction with kernels and Principal Component Analysis 8. deploy various machine learning models for solving real world problems.
Indicative Contents المحتويات الإرشادية	This course contains the following topics: • What is machine learning? • Types of machine learning algorithms • Supervised, unsupervised, and reinforcement learning. • Machine learning mathematical models. • Data cleaning and handling missing data. • Data normalization and scaling • Feature selection and extraction • Basics of neural networks and artificial neural networks • Feature engineering models • Introduction to unsupervised learning • Discussing machine learning applications in real-world scenarios • Machine learning applications in real-world problems. • Showcasing student projects highlighting machine learning applications. • Presentations and evaluations for projects.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• An actual account of a particular incident and/or problem is presented to the class. How the matter was resolved is included. • It is used when a specific example is the best means of illustrating a topic. • This method is often used to supplement traditional lecture approaches to a topic. • Can be used to synthesize ideas and apply theory to practical problems. • Cooperative Learning Techniques

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	2 and 8	1,2,7,8
	Assignments	2	10% (10)	2 and 12	3,4,5,6
	Projects / Lab.	1	10% (10)	Continuous	All
	Presentation	1	10% (10)	13	4,5,6,7,8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Machine Learning**
Week 2	**Introduction to Machine Learning models**
Week 3	**Data Preprocessing**
Week 4	**Feature extraction techniques**
Week 5	**Supervised Learning Neural Network**
Week 6	**Supervised Learning linear regression**
Week 7	**Supervised Learning classification**
Week 8	**Mid Term**
Week 9	**Unsupervised Learning**
Week 10	**Unsupervised Learning**
Week 11	**Feature engineering models**
Week 12	**Case studies: Discussing**
Week 13	**Case study: Projects**
Week 14	**Project showcase**
Week 15	**Week 15: Project showcase**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to Anaconda**
Week 2	**performing examples for Machine Learning algorithms**
Week 3 , 4	**Data Preprocessing**
Week 5	**Feature Extraction**
Week 6,7	**Supervised Learning**
Week 9,10	**Unsupervised Learning**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Miroslav Kubat, An Introduction to Machine Learning, Third Edition, 2021, Pearson, ISBN 978-3-030-81934-7 • Mark Fenner, Machine Learning with Python for Everyone, 2020, Pearson, ISBN-13: 9780134845685.	No
Recommended Texts	• Andrea Giussani, APPLIED MACHINE LEARNING WITH PYTHON, Copyright © 2019, EGEA • Paul Deitel, Deitel , Harvey M. Deitel, Deitel , Intro to Python for Computer Science and Data Science: Learning to Program with AI, Big Data and The Cloud, 2020 • Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining: Pearson New International Edition2006,Pearson	No
Websites	• ***https://scikitlearn.org/0.19/datasets/index.html*** **The UCI Machine Learning Repository:** • ***https://archive.ics.uci.edu/ml/datasets.html*** *Kaggle, www.kaggle.com/datasets*	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Communication**			**Module Delivery**	
Module Type	**Basic learning activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MOCO 4103**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	◦ Understand the basic concepts and technologies of mobile communication ◦ Analyze the performance of mobile communication systems ◦ Design and implement mobile communication systems ◦ Apply mobile communication technologies to solve real-world problems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	students should be able to:- 1. 1. Understanding the fundamental concepts and principles of mobile communication technologies, including wireless networks, cellular systems, and mobile data transmission. 2. Demonstrating knowledge of the different generations of mobile communication systems (e.g., 2G, 3G, 4G, 5G) and their respective features, capabilities, and limitations. 3. Analyzing and evaluating the architecture, protocols, and standards used in mobile communication networks. 4. Applying theoretical knowledge to practical scenarios, such as designing and optimizing mobile networks, troubleshooting network issues, and assessing network performance. 5. Understanding the impact of mobile communication on society, including social, economic, and ethical considerations. 6. Developing critical thinking and problem-solving skills related to mobile communication technologies and their applications. 7. Effectively communicating technical concepts and findings related to mobile communication through oral presentations, written reports, and o.
Indicative Contents المحتويات الإرشادية	. 1. Introduction to Mobile Communication: History, evolution, and basic concepts. 2. Wireless Communication Technologies: GSM, CDMA, 3G, 4G, 5G, etc. 3. Mobile Network Architectures: Cellular networks, base stations, mobile switching centers. 5. Mobile Network Security: Encryption, authentication, privacy concerns. 6. Mobile Application Development: Designing and developing applications for mobile devices. 7. Mobile Internet and Data Services: Mobile web browsing, mobile apps, streaming services. 8. Mobile Network Planning and Optimization: Coverage, capacity, network performance.

	9. Mobile Network Management: Troubleshooting, maintenance, network monitoring. 10. Emerging Trends in Mobile Communication: Internet of Things (IoT), wearable devices, mobile computing.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	❖ 1. Network Coverage Expansion: Ensuring a widespread network coverage to reach as many mobile users as possible. ❖ 2. Spectrum Management: Efficiently managing the allocation and utilization of radio frequencies to accommodate the increasing demand for mobile communication. ❖ 3. Technology Upgrades: Embracing advancements in mobile technologies (e.g., 5G) to offer faster speeds, lower latency, and support for emerging applications

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
	Quizzes	2	10% (10)	7, 12	LO #1-5

Formative assessment	**Assignments**	2	10% (10)	4, 10	All
	Projects / Lab.	1	10% (10)	7	All
	Report	1	10% (10)	12	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Mobile Communication
Week 2	Mobile Radio Networks
Week 3	Cellular Networks: Fundamentals of cellular networks, including architecture, radio frequency (RF) planning, and network components.
Week 4	Wireless Communication Technologies: Study of various wireless communication technologies used in mobile networks, such as GSM, CDMA, 3G, 4G, and 5G.
Week 5	Mobile Applications
Week 6	Mobile Network Protocols: Understanding the protocols used in mobile communication, including signaling protocols, data transmission protocols, and network security protocols.
Week 7	Mid Exam, Mobile Application Development: Introduction to mobile app development platforms.
Week 8	programming languages, and frameworks used in creating mobile applications
Week 9	Mobile Services and Applications: Exploration of different mobile services and applications, such as mobile messaging, mobile commerce, location-based services, and mobile entertainment
Week 10	Mobile Network Optimization: Techniques and strategies for optimizing mobile network performance, capacity planning, and quality of service (QoS) management
Week 11	Emerging Trends in Mobile Communication: Discussion on the latest trends and advancements in mobile communication, such as Internet of Things (IoT), mobile cloud computing, and mobile edge computing.
Week 12	5G and beyond: Next-generation mobile networks and technologies
Week 13	Future Trends in Mobile Communication
Week 14	Mobile application development and deployment
Week 15	Seminar and project discussion
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**• Mobile Communication Systems by Andrew J. Viterbi and Andrew M. Viterbi** **• Mobile Cellular Telecommunications by Tero Ojanperä and Kai R. Niemi** **• Mobile Radio Communications by John B. Anderson, Steven C. Estrin, and Ramesh R. Rao**	Yes
Recommended Texts		Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Network protocols**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NEPR 4101				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	4		**Semester of Delivery**	1	
Administering Department	Network		**College**	Engineering	
Module Leader	satea hikmat alnajjar		**e-mail**	E-mail	
Module Leader's Acad. Title	Assit.Prof.Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Computer Network II	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course studies the standard models for the layered approach to communication in a network, and the main characteristics of data transmission across various physical link types. It considers how to design networks and protocols for diverse situations, analyses several application and support protocols from a distributed systems viewpoint, and identifies significant problem areas in networked communications. The objectives expected to be covered: 1. To allow access to network resources 2. To translate, encrypt and compress data. 3. To establish, manage, and terminate the session. 4. The transport layer builds on the network layer to provide data transport from a process on a source machine to a process on a destination machine. 5. To provide internetworking, to move packets from source to destination. 6. To organize bits into frames, to provide hop-to-hop delivery.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion, students will have the knowledge and skills to: 1. Understand and describe the layered protocol model. 2. Conceptual, implementation aspects of network application protocols, furthermore examining popular application-level protocols 3. Students will demonstrate an understanding of network architecture, both hardware and software. 4. Design, analyse, and evaluate networks and services for homes, client/server, LANs and WANs. 5. Describe, analyse and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research. 6. Once the basic concepts of protocol working behavior are understood, the student takes part in hands-on projects to demonstrate the ability of the knowledge gained from the course.
Indicative Contents المحتويات الإرشادية	The fourth stage of network protocols typically builds upon the foundation established in earlier stages and introduces more advanced features and functionalities. While the specific contents may vary depending on the

	protocol suite or framework being considered, here are some indicative contents for network protocols at the fourth stage: • Quality of Service (QoS): QoS mechanisms are introduced to prioritize and manage different types of network traffic, ensuring optimal performance for critical applications and services. This may involve techniques such as traffic shaping, prioritization, and bandwidth allocation. • Multicast and Broadcast: Protocols at this stage often include support for multicast and broadcast communication, enabling efficient dissemination of data to multiple recipients simultaneously. This is particularly useful for multimedia streaming, video conferencing, and other collaborative applications. • Security: Advanced security measures become an integral part of network protocols at this stage. This includes encryption, authentication, integrity checks, and access control mechanisms to protect data confidentiality and prevent unauthorized access or tampering. • IPv6: With the depletion of IPv4 addresses, network protocols at this stage heavily focus on IPv6, the next-generation Internet Protocol. IPv6 introduces a larger address space, improved routing, and enhanced support for security and QoS features. • Multilayer Protocols: Network protocols at this stage integrate and coordinate across multiple layers of the protocol stack, including the network, transport, and application layers. This allows for efficient end-to-end communication and better coordination between different network components.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. HomeWorks 3. Assailments 4. Project / Lab

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, and #2
	Assignments	2	10% (10)	2 and 12	LO #3.
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #4
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What Is a Protocol, What Is the Internet? A Nuts-and-Bolts Description ,A Services Description , Network Edge, handshaking protocol.
Week 2	Protocol Layers and Their Service Models, layered Architecture, Encapsulation.
Week 3	Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet.
Week 4	**Application-Layer Protocols.** The Web and HTTP, Overview of HTTP, Non-Persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET.
Week 5	File Transfer: FTP, FTP Commands and Replies, Electronic Mail in the Internet SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols.

Week 6	Socket Programming: Creating Network Applications, Socket Programming with UDP, Socket Programming with TCP.
Week 7	Mid-term + Overview of How DNS Works, DNS Records and Messages. Homework Problems and Questions, Socket Programming Assignments, Wireshark Labs: HTTP, DNS.
Week 8	**Transport-Layer Protocols.** Relationship Between Transport and Network Layers, Connectionless Transport: UDP, Segment Structure, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol.
Week 9	**Pipelined Reliable Data Transfer Protocols,** Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, Principles of Congestion Control, TCP Congestion Control. Homework Problems and Questions, Wireshark Labs: TCP, UDP
Week 10	Network -Layer Protocols. Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, What's Inside a Router, The Internet Protocol (IP): Forwarding and Addressing on the Internet, Datagram Format. Homework Problems and Questions, Wireshark Labs.
Week 11	IPv4 Addressing, Internet Control Message Protocol (ICMP), IPv6, Routing Algorithms, Dijkstra s algorithm, shortest paths, The Link-State (LS) Routing Algorithm , The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Intra-AS Routing in the Internet: OSPF. [Homework Problems and Questions, Wireshark Labs: IP, ICMP}
Week 12	Link Layer: Links, Access Networks, and LANs, The Services Provided by the Link Layer, Where Is the Link Layer Implemented, Error-Detection and -Correction Techniques, Parity Checks, check summing Methods, Cyclic Redundancy Check (CRC), Link-Layer Addressing and ARP, Multiprotocol Label Switching (MPLS), Ethernet frame structure. [Homework Problems and Questions, Wireshark Labs].
Week 13	Assignment project and presentation SMTP, point-to-point, Telnet protocol, FTP.
Week 14	Assignment project and presentation TCP, UDP, Transport Layer Security (TLS) &SSL, Routing Information Protocol. Streaming video and (VoIP).
Week 15	Assignment project and presentation Real Time Streaming Protocol (RTSP) Open Shortest Path First OSPF, Skype, IP6, 802.11 versions a/b/g/n , 802.15.4 .
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to set up Wireshark
Week 2	Lab 2: The Basic HTTP GET/Response Interaction
Week 3	Lab 3: The HTTP Conditional GET/Response Interaction
Week 4	Lab 4: Http Authentication.
Week 5	Lab 5: Retrieving Long Documents
Week 6	Lab 6: HTML Documents with Embedded Objects
Week 7	Lab 7: Understanding TCP Sequence and Acknowledgment Numbers
Week 8	Lab 8: Capturing A Bulk TCP Transfer from Your Computer To A Remote Server
Week 9	Lab 9: nslookup tool, Tracing DNS with Wireshark
Week 10	Lab 10: Understanding telnet protocol
Week 11	Lab 11: Examine The DHCP
Week 12	Lab 12: ICMP and Ping, capturing packets from an execution of traceroute
Week 13	Lab 13: Ethernet and ARP, ARP Caching, Observing ARP in action
Week 14	Lab 14: NAT protocol, NAT Measurement Scenario
Week 15	Lab 15: Understanding Wi-Fi 802.11

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Computer Networking: A Top-Down Approach., this reference has been adopted for use at many hundreds of colleges and universities, translated into 14 languages, and used by over one hundred thousand students and practitioners worldwide. And it has been adopted as a source. .	Yes
Websites	https://www.goodreads.com/book/show/83847.Computer_Networking	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	QUEUING THEORY			**Module Delivery**	
Module Type	**CORE**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	QUTH 4102				
ECTS Credits	**4.00**				
SWL (hr/sem)	**100**				
Module Level	UGIV		**Semester of Delivery**	Seven	
Administering Department	Network Engineering		**College**	Engineering	
Module Leader	Samar Kareem Ibrahim		**e-mail**	Samar.kareem90@gmail.com	
Module Leader's Acad. Title	ASST. LECTURER		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Control Engineering	**Semester**	Six
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce students to the basic concepts and principles of queuing theory, including arrival processes, service processes, queueing models, and performance metrics. 2. To develop students' skills in analyzing and modeling different types of queuing systems, such as M/M/1, M/M/c, M/G/1, and more. Students should be able to understand the assumptions and characteristics of each model and apply appropriate techniques to analyze their performance. 3. To enable students to apply queuing theory concepts and models to analyze and evaluate the performance of network systems. This includes assessing parameters like throughput, delay, packet loss, and resource utilization in different network scenarios. 4. To enhance students' problem-solving and analytical skills through hands-on exercises, case studies, and real-world applications of queuing theory in network engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the key concepts and principles of queuing theory and its relevance to network engineering. 2. Analyze and model different types of queuing systems, including single-server and multi-server systems, using appropriate queuing models. 3. Apply queuing theory techniques to analyze and evaluate the performance of network systems, including parameters such as throughput, delay, packet loss, and resource utilization. 4. Use appropriate mathematical and analytical techniques to solve queuing-related problems in network engineering. 5. Demonstrate critical thinking and problem-solving skills by evaluating and proposing solutions for queuing-related challenges in network engineering. 6. Apply queuing theory principles to make informed decisions regarding network design, capacity planning, and performance optimization. 7. Communicate queuing theory concepts, analysis, and solutions effectively through written reports and presentations.

Indicative Contents المحتويات الإرشادية	1. Introduction to Queuing Theory: • Definition and importance of queuing theory in network engineering • Basic queuing models and their components (arrival processes, service processes, queues, etc.) • Performance metrics and measures in queuing systems (throughput, delay, packet loss, etc.) 2. Single-Server Queuing Models: • M/M/1 model: Characteristics, steady-state analysis, and performance evaluation • M/M/c model: Characteristics, steady-state analysis, and performance evaluation • M/G/1 model: Characteristics, steady-state analysis, and performance evaluation 3. Multi-Server Queuing Models: • M/M/c/c model: Characteristics, steady-state analysis, and performance evaluation • M/G/c model: Characteristics, steady-state analysis, and performance evaluation • Queuing networks: Introduction to basic concepts and analysis techniques 4. Performance Evaluation and Analysis: • Approximation methods (e.g., Little's Law) for performance analysis • Queuing theory applications in network performance evaluation and optimization
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional classroom lectures can be used to introduce key concepts, theories, and mathematical foundations of queuing theory. Lectures can also include demonstrations of queuing models and analysis techniques. 2. Practical Examples and Case Studies: Incorporate practical examples and case studies from real-world network engineering scenarios to illustrate the application of queuing theory. This can help students understand the relevance of queuing theory in solving network performance problems. 3. Problem-Solving Sessions: Conduct problem-solving sessions where students work on queuing-related problems and exercises. Encourage students to apply the concepts learned to analyze and solve queuing problems in network engineering. 4. Assessments and Examinations: Conduct regular assessments and examinations to evaluate students' understanding of queuing theory principles, analysis techniques, and their ability to apply them to network engineering scenarios. This can include theoretical questions, problem-solving exercises, and case study analysis.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	2 - 11	LO #1 - 5
	Assignments	2	5% (5)	3 – 9	LO # 3, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	30% (30)	8	LO # 1 - 6
	Final Exam	3hr	60% (60)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**1 INTRODUCTION TO QUEUEING SYSTEMS** 1.1 Queueing Systems 1.2 Classification of Basic Queueing Systems 1.3 Queueing System Performance Parameters
Week 2	1.4 Little's Law 1.5 Poisson Arrivals See Time Averages (PASTA)
Week 3	**2 MARKOVIAN QUEUEING SYSTEMS** 2.1 M/M/1 Queue
Week 4	2.2 Transient Behavior of M/M/1 Queueing System
Week 5	2.3 M/M/m Queueing System

Week 6	2.4 M/M/∞Queueing System 2.5 M/M/m/m Queueing System
Week 7	2.6 M/M/1//N Queueing System
Week 8	**MID-EXAM, 3 NON-MARKOVIAN QUEUEING SYSTEMS** 3.1 M/G/1 Queueing System
Week 9	**4 QUEUEING NETWORKS** 4. 1 Introduction of Queueing Networks
Week 10	4.2 Open, Jackson Type Queueing Networks
Week 11	4.3 Closed, Gordon-Newell Type Queueing Networks
Week 12	**5 APPLIED QUEUEING SYSTEMS** 5.1 Bandwidth Sharing of Finite Capacity Links with Different Traffic Classes
Week 13	5.2 Packet Transmission Through Slotted Time Channel
Week 14	**6 APPLICATIONS IN THE ANALYSIS OF COMPUTER AND COMMUNICATION SYSTEMS** 6.1 Modeling Computer Systems
Week 15	6.2 Modeling Communication Systems
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	László Lakatos • László Szeidl • Miklós Telek,“ Introduction to Queueing Systems with Telecommunication Applications”, Second Edition, Springer Nature Switzerland AG 2019	
Recommended Texts	U. Narayan Bhat, “An Introduction to Queueing Theory, Modeling and Analysis in Applications”, Second Edition, Springer Science+Business Media New York 2015	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Module Information
معلومات المادة الدراسية

Module Title	**Graduation Project and Research Methodology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GPRM 4105**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	NE		**College**	Type College Code	
Module Leader	Dr. Omar Hussein Salman		**e-mail**	Omar.salman@aliraqia.edu.iq	
Module Leader's Acad. Title	Assoc. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course will enable the students to: 1. Acquire knowledge on the key concepts, terminologies, methods, techniques, and tools in conducting research relevant to Information Technology and/or Information Systems. 2. Demonstrate knowledge and skills in writing a research paper. 3. Recognize the importance of research in the fields of Computing and Information Science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will be able to: 1. Discuss the key concepts, methods, and techniques used in computing and information science research. 2. Understand the referencing and the Management of Information 3. Literature Searching and The Review of the Literature 4. Understand research objectives, aim of work and scope of work. 5. Understand data flow and research requirements. 6. Perform presentation skills.
Indicative Contents المحتويات الإرشادية	This course contains the following topics: 1. Introduction to Research Methodology 2. Approaches to Research 3. Planning the Research Project 4. Reading, Referencing and the Management of Information 5. Literature Searching 6. The Review of the Literature 7. Research Design 8. Sampling Design 9. Methods of Data Collection 10. Measurement and 11. Scaling Techniques 12. Processing and Analysis of Data 13. Interpretation 14. Writing the Report

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this course, the instructor can follow the following strategies: • Classroom Teaching, • Self-Study, • Group Work on finding and organizing references, • Oral Presentation

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	Quiz 1	1	5% (5)	2	1,2
	Quiz 2	1	5% (5)	8	1,2,3,4
	Literature Review	1	10% (10)	4	1,2,3,4,5
	Research Proposal	1	10% (10)	9	1,2,3,4,5,6
	Data Collection Instrument	1	10% (10)	2 and 12	7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	1,2,3,4,5,6
	Final Exam Presentation	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Research Methodology**
Week 2	**Approaches to Research**
Week 3	**Planning the Research Project**
Week 4	**Reading, Referencing and the Management of Information**
Week 5	**Literature Searching**
Week 6	**The Review of the Literature**
Week 7	**Mid Term**
Week 8	**Defining objectives**
Week 9	**Aim of work**
Week 10	**Scope of work**
Week 11	**Data flow and research requirements**
Week 12	**Research Design**
Week 13	**Sampling Design**
Week 14	**Initial results**
Week 15	**Presentation Skills**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Bell, J., & Waters, S. (2014). Doing Your Research Project : A Guide for First-time Researchers (Vol. Sixth edition). Maidenhead, Berkshire, England: McGraw-Hill Education. Retrieved from:	No
Recommended Texts	Research Methodology: A Step by-Step Guide for Beginners 5th Edition by Ranjit Kumar, SAGE Publications Ltd; 5th edition (December 10, 2018)	No
Websites	https://search.ebscohost.com/login.aspx?direct=truedb=e000xww&AN=937946&site=eds-live	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Software Engineering			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	SOEN 4106				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	**Semester of Delivery**		7
Administering Department		NE	**College**	Type College Code	
Module Leader	Dr. Omar Hussein Salman		**e-mail**	Omar.salman@aliraqia.edu.iq	
Module Leader's Acad. Title		Assoc. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course describes the basic tasks that any successful software project must handle in some way. They explain the main steps in software development and describe some of the myriad ways a project can fail to handle those tasks. The subsequent chapters explain the pieces of the development process in greater detail as follow: 1. Software Engineering from 20,000 Feet 2. Before the Beginning 3. Project Management 4. Requirement Gathering 5. High-Level Design 6. Low-Level Design 7. Development 8. Testing
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn the basic and applied concepts of Software Engineering with the following fundamentals: 1. Understand the basic principles of software engineering. 2. Understand document management system. 3. Apply software engineering principles to real-world problems. 4. Understand high-level and low- level design. 5. Understand testing processes and levels. 6. Design, develop, and test software systems. 7. Manage software projects. 8. Understand behavior and structural models. 9. Ensure the quality of software systems. 10. Conduct research in software engineering 11. Communicate effectively about software engineering topics.
Indicative Contents المحتويات الإرشادية	This course describes software engineering, the tasks that engineering or students must perform to successfully complete a software project, and some of the most popular developer models that can be used to achieve the main goals. It describes some general ideas and concepts that make it easier to build robust software, but its focus is on a specific programming language, so it can't take advantage of language-specific tools or techniques. The student will learn the basic and applied concepts of Software Engineering with the following fundamentals:

	• The basic steps required for successful Software Engineering. • Ways in which software engineering differs from other kinds of • Engineering • The features that a document management system provides. • Why documentation is important. • How you can easily archive e-mails for later use. • Typical types of documentation • What project management is and why you should care. • How to use PERT charts, critical path methods, and Gantt charts to • create project schedules and estimate project duration. • How you can improve time estimates • How risk management lets you respond quickly and effectively to Problems • Audience-oriented, FURPS, and FURPS+ methods for categorizing requirements. • Brainstorming techniques • Specific things you should include in a high-level design.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Flip class 3. Assignment, project and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to course details
Week 2	What is Software Engineering.
Week 3	• Software product Examples • What is project-based software engineering?
Week 4	• The basic steps for successful software Eng. • The ways in which software engineering is different than other engineering.
Week 5	• The features that document management systems provide. • The impact of mistakes
Week 6	• Documentation • How and why use email
Week 7	• Project Management • PERT charts, critical path methods
Week 8	• create project schedules. • and Gantt charts to
Week 9	estimate project duration How you can improve time estimates.
Week 10	Risk Management
Week 11	Monthly exam
Week 12	FURPS, and FURPS+ methods
Week 13	Methods for gathering customer goals
Week 14	High-Level Design
Week 15	Presentations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	beginning Software Engineering • Author: Rod Stephens • Publisher: John Wiley • Publishing year: 2015	Yes
Recommended Texts	Any other relevant book.	No
Websites	• www.wrox.com/go/beginningsoftwareengineering —This book's web page. • p2p.wrox.com —Wrox P2P forums. • www.wrox.com —The Wrox website. Contains errata and other information. Search for books by title or ISBN	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**AC Electrical Circuits**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ELCA 1202**				
ECTS Credits	**4**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	NED		**College**	NEEC	
Module Leader	Ali Mahmood Jasim		**e-mail**	drali7819@gmail.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DC Electrical Circuits	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The module aims to: 1. To provide a comprehensive understanding of alternating current (AC), including its principles, characteristics, and waveform representation, as well as the significance of RMS value and average value in AC circuits. 2. To develop proficiency in working with phasor quantities, including their definition, representation in polar and rectangular forms, and the ability to perform arithmetic operations such as multiplication, division, addition, and subtraction. 3. To analyze resonance circuits, both in series and parallel configurations, in order to determine conditions for resonance, calculate key parameters such as current, voltage, impedance, phase angle, and frequency at resonance, and evaluate bandwidth and quality factor. 4. To investigate the impact of AC on different circuit configurations, ranging from resistance-only circuits to circuits with pure inductance or capacitance, as well as combinations of resistance, inductance, and capacitance. This includes determining phase angles between current and voltage for each circuit type. 5. To explore the concept of power in AC circuits, encompassing the calculation of power in circuits with various components (resistance, inductance, capacitance) in series and parallel. Additionally, to comprehend active and reactive power, power factor, and techniques to improve power factor. The course will also cover the application of theories such as Norton's theorem, Thevenin's theorem, and impedance matching in AC circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The module aims to achieve the following five learning outcomes: 1. Understand the fundamental principles of alternating current (AC) and its characteristics, including waveform representation, RMS value, average value, and their significance in electrical circuits. 2. Apply phasor analysis techniques to analyze AC circuits, including the representation of phasor quantities, calculation of phase angles, and performing arithmetic operations on phasors. 3. Analyze resonance circuits, both in series and parallel configurations, and determine key parameters such as current, voltage, impedance, phase angle, and bandwidth. 4. Evaluate the effect of alternating current on circuits with different combinations of resistance, inductance, and capacitance, including determining phase angles between current and voltage. 5. Understand power in AC circuits, including calculating active and reactive power, analyzing power factor and its impact on AC circuits, and applying relevant theorems and techniques for power measurement and analysis.
Indicative Contents المحتويات الإرشادية	The module may cover the following five indicative contents: 1. AC Quantities: • Definition and characteristics of alternating current. • Generation and waveform representation of AC.

	• Relationships and definitions of RMS value, average value, and their significance. • Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current 2. Phasor Quantities: • Definition of phasor quantities. • Representation of phasors in polar and rectangular forms. • Calculation of phase angle. • Operations on phasor quantities including multiplication, division, addition, and subtraction. 3. Effect of Alternating Current on Circuits: • Series AC circuits: voltage division, current division, and impedance calculations. • Parallel AC circuits: current division, voltage division, and admittance calculations • Series-parallel combinations of AC circuits • Power calculations in AC circuits with different components (resistors, inductors, capacitors). • Real power, reactive power, apparent power, and Power factor 4. AC circuit analysis methods: • Nodal analysis and mesh analysis for AC circuits • Superposition theorem for AC circuits • Thevenin and Norton equivalent circuits for AC circuits 5. Resonance Circuits: • Definition and conditions for resonance. • Series and parallel resonance circuits. • Calculation of current, voltage, impedance, phase angle, and frequency at resonance. • Determining bandwidth and quality factor.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning and teaching strategies for the AC Circuits module can vary depending on the specific educational institution and instructor. However, here are some common strategies that can be effective for teaching this module:

	● Lectures: Conducting lectures to introduce and explain fundamental concepts, principles, and theories related to AC circuits. This can include providing clear explanations, using visual aids such as slides or demonstrations, and engaging students through interactive discussions. ● Practical Demonstrations: Organizing practical demonstrations or laboratory sessions where students can observe and interact with real AC circuits. This hands-on experience allows them to apply theoretical knowledge, perform measurements, and analyze circuit behavior. ● Problem-Solving Sessions: Facilitating problem-solving sessions to enhance students' understanding of AC circuit analysis and calculation techniques. This involves presenting practice problems of increasing complexity and guiding students in step-by-step problem-solving strategies. ● Simulations and Virtual Labs: Utilizing computer simulations and virtual laboratory environments to provide interactive and immersive experiences. This allows students to simulate and analyze AC circuits, observe waveforms, and manipulate circuit parameters, reinforcing their understanding of concepts and principles. ● Group Discussions and Collaborative Learning: Encouraging group discussions and collaborative learning activities where students can actively engage with their peers. This can involve solving problems as a group, analyzing case studies, or engaging in debates and discussions to deepen their understanding of AC circuit concepts. ● Multimedia Resources: Incorporating multimedia resources such as online videos, interactive animations, and virtual tools to supplement lectures and provide additional visual representations of AC circuit phenomena. ● Assessments and Feedback: Implementing formative and summative assessments to evaluate students' understanding and progress. This can include quizzes, assignments, laboratory reports, and examinations. Providing timely feedback on assessments helps students identify areas of improvement and reinforces their learning. ● Self-Study Materials: Recommending textbooks, reference materials, and online resources for students to further explore AC circuit concepts independently. This promotes self-directed learning and allows students to deepen their understanding at their own pace. By employing a combination of these strategies, instructors can create an engaging and effective learning environment for students studying AC circuits.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	60	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Definition and characteristics of alternating current. • Generation and waveform representation of AC.
Week 2	• Relationships and definitions of RMS value, average value, and their significance. • Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current
Week 3	• Definition of phasor quantities. • Representation of phasors in polar and rectangular forms. • Calculation of phase angle.
Week 4	• Operations on phasor quantities including multiplication, division, addition, and subtraction. • Series AC circuits: voltage division, current division, and impedance calculations.
Week 5	• Parallel AC circuits: current division, voltage division, and admittance calculations.

	• Series-parallel combinations of AC circuits
Week 6	• Power calculations in AC circuits with different components (resistors, inductors, capacitors).
Week 7	• Nodal analysis and mesh analysis for AC circuits.
Week 8	• Mid-Exam
Week 9	• Superposition theorem for AC circuits
Week 10	• Thevenin and Norton equivalent circuits for AC circuits
Week 11	• Definition and conditions for resonance. • Series and parallel resonance circuits.
Week 12	• Calculation of current, voltage, impedance, phase angle, and frequency at resonance.
Week 13	• Mid-Exam
Week 14	• Determining bandwidth and quality factor.
Week 15	• Review and revision
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Capacitive and Inductive Reactance.
Week 2	R-L-C in Series for AC Circuits.
Week 3	R-L-C in Series and Parallel for AC Circuits.
Week 4	Series and Parallel R-L-C for AC Circuits.
Week 5	Thevenin's Analysis.
Week 6	AC Superposition.
Week 7	Series Resonance AC Circuits.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition.	Yes
Recommended Texts	AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	http://www.dissidents.com/resources/ACElectricalCircuitAnalysis.pdf	No

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	Code			☒ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Name		**e-mail**	@aliraqia.edu.iq	
Module Leader's Acad. Title	Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics I	**Semester**	1

Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of complex numbers and their properties. 2. Understand the differentiation and integration of inverse trigonometric functions. 3. Understand the differentiation and integration of hyperbolic trigonometric functions. 4. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 5. Identify integration applications such as Area under curve and area between two curves. 6. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 7. Understand polar coordinates and their properties. 8. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part

	• Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve • Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties • Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5
	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamental Concepts of complex numbers.
Week 2	Complex numbers properties- power and roots
Week 3	Introduction to Inverse Trigonometric function and their differentiation
Week 4	Inverse Trigonometric function Integration
Week 5	Introduction to Hyperbolic Trigonometric functions and their differentiation
Week 6	Hyperbolic Trigonometric functions integration
Week 7	**Mid-term Exam**
Week 8	Methods of integration – Integration by Part and integration using Partial fraction method
Week 9	Methods of integration – Integration using substation
Week 10	Integration applications – Area under curve and Area between two curves
Week 11	Integration applications – Area between two curves
Week 12	Integration applications – Volume of solid using Disk and Washer methods
Week 13	Introduction to polar coordinates and its properties
Week 14	Integral applications using polar coordinates – Area and length of curve (PART1)

Week 15	Integral applications using polar coordinates – Area and length of curve (PART2)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**programming techniques I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COPR 1205**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	Object oriented programming	**Semester**	1st

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To learn how to write inline functions for efficiency and performance. 2. To learn the syntax and semantics of the C++ programming language. 3. To learn how to overload functions and operators in C++. 4. To learn how functions implement. 5. To present different computer languages and learn c++ 6. To learn elements of code writing. 7. To write and execute programs with the programming language C++. 8. To deep study programming, develop algorithmic thinking and then add technological knowledge regarding the C++ language. 9. To learn how Iteration and recursion work. 10. To understand the precedence of operators in c++. 11. To write, understand, compile and debug C++ programs 12. To write programs using the basic programming elements such as variables, data types, selection and looping control structures, functions, and arrays. 13. To Understand the concept of a program (i.e., a computer following a series of instructions) 14. To Understand the concept of a variable holding a value, how a variable is declared and how it can change 15. To Understand the concept of a loop – that is, a series of statements which is written once but executed repeatedly- and how to use it in a programming language 16. Be able to use a conditional statement to select a choice from two or more alternatives 17. Be able to break a large problem into smaller parts, writing each part as a module or function 18. Be able to use an array to store multiple pieces of homogeneous data 19. To Understand the concept of an algorithm (that is, a series of steps that can be carried out in a mechanical way) and a few specific examples of algorithms (for example, finding an average, sorting, searching) 20. To Understand the parts of a computer system and how they interact 21. To Understand the concept of a program in a high-level language being translated by a compiler into machine language program and then executed.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course requirements, a student should be able to: 1. The course has improved my ability to use C++ programming language to solve elementary engineering problems. 2. The course has improved my understanding of and an ability to use data types, variables, and arithmetic operators. 3. The course has improved my ability to use conditional statements and loops structures. 4. The course has improved my understanding of the use of arrays. 5. The course has improved my ability to use mathematic library.

	6. The course has improved my ability to develop function. 7. The course has improved my understanding of the distinction for passing arguments to/from functions and Apply the principles of functions 8. The course has improved my ability to use standard input/output. 9 The course has improved my ability to use object oriented programming in C++ to solve basic engineering problems. 10. The course has improved my ability to use templates and standard template library. 11.learn about The basic programming 12. about Arranging same data systematically with arrays 13. Use functions in your C++ program 14. Understand tokens, expressions, and control structures 15. Explain arrays and create programs using them 16. Ability to read, write and debug C++ code including use of the C++ standard library 17. Analyze a problem, using algorithms to create computer systems and appropriate problem solving using a programming language. 18. Write different types of loops, such as for, while and do-while Select the correct type of loop based on a given problem and can Use the keywords break and continue in loop. 19. Use loops to solve common problems, such as, finding sum, finding max, etc. 20. Write nested loops
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Computers and their uses/ Hardware/Software, Fundamentals of Computer, Programming languages/How to use/ run programs. [hrs] Design and representation of algorithms/ implementation / testing and verification/ program documentation. [hrs] Introduction. Basic overview of C++, General structural, variable, libraries. [hrs] input and output/ data types. [hrs] arithmetic and logical operators, precedence of operators. [hrs] C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else. [hrs] Switch-case statements, nested switch-case statement. [hrs] Counter controlled and sentinel controlled repetition. For loop. [hrs] The do-while and while loops. [hrs] Skipping loop iterations break and continue, Labels and goto statement, nested loops. [hrs] Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing. [hrs] Two-dimensional array creation, initialization and processing. [hrs] Functions in C++ / new function creation return values and call, Formal parameters call by value and call by reference/ Math and other standard library functions. [hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- A group thinking skill strategy. 2- Critical thinking strategy in learning. 3- Brainstorming.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computers and their uses/ Hardware/Software, Fundamentals of Compute , Programming languages/How to use/ run programs.

Week 2	Design and representation of algorithms/ implementation / testing and verification/ program documentation.
Week 3	Introduction. Basic overview of C++, General structural, variable, libraries.
Week 4	input and output/ data types.
Week 5	arithmetic and logical operators, precedence of operators.
Week 6,7	C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else.
Week 8	Switch-case statements, nested switch-case statement.
Week 9	Counter controlled and sentinel controlled repetition. For loop.
Week 10	The do-while and while loops.
Week 11	Skipping loop iterations break and continue, Labels and goto statement, nested loops.
Week 12	Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing.
Week 13	Two-dimensional array creation, initialization and processing.
Week 14	Functions in C++ / new function creation return values and call, Formal parameters call by value and call by reference/ Math and other standard library functions.
Week 15	Mid-term Exam.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: implement and apply input and output/ data types in program.
Week 2	Lab 2: implement and apply arithmetic and logical operators, precedence of operators in programs.
Week 3	Lab 3: implement and apply If statement, nested if statement, if-else if ladder else in programs.
Week 4	Lab 4: implement and apply Switch-case statements, nested switch-case statement in programs.
Week 5	Lab 5 implement and apply For loop in programs.
Week 6	Lab 6: implement and apply The do-while and while loops in programs.
Week 8	Lab 7: implement and apply break and continue, Labels and goto statement, nested loops in programs.
Week 8	Lab 8: implement and apply One-dimensional array creation, initialization and processing in programs.

Week 9	Lab 9: implement and apply Two-dimensional array creation, initialization and processing in programs.
Week 10	Lab 10: implement and apply Functions in C++ in programs.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Mastering c++ by sorhan sami & oqeli saleh 2002. 2. Cay S. Horstmann, Computing Concepts with C++ Essentials, 3rd edition, John Wiley, 2003	Yes
Recommended Texts	Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007.	Yes
Websites	https://www.youtube.com/watch?v=vLnPwxZdW4Y https://www.youtube.com/watch?v=WlH97Ko1xHo&list=PLF8OvnCBlEY1W54Am_lA9uXK1gAyExMmP	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Technical Workshop**			**Module Delivery**	
Module Type	**Supplementary**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	TEWO 1204				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	1- Mazin Nabih Ali		**e-mail**	Mazinnabih@gmail.com	
Module Leader's Acad. Title	Assistant Lecture		**Module Leader's Qualification**	master	
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name	Dr. Omar hassan hameed		**e-mail**	Eng.ohh.2014@gmail.com	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	A. Introduce students the basics of electrical and electronic devices, tools and circuits. B. Introduce students the basics of joining; welding and soldering processes. C. Introduce students to the basics of the electrical device and circuits with improving the skills that deal with methods of measurement and standardization. D. Introduce students to the basics of transformers, types and design. E. Introduce students to the basics of capacitors include the charging and dis charging circuits and the methods of test. F. Introduce students to the industrial electrical and skill of using tools and design of electrical circuits and control panels. G. Introduce students to the basics of the welding arts and installation of metal and the types of welding machines and skills to deal with the kinds of welding and measurement methods and standardization. H. Developing student skills in welding and soldering operations. I. Making students dealing with the problem and damage circuits to repair and fix it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Acquire knowledge and understanding 2- Preparation of practical engineers in the field of electrical, network and computer engineering who are characterizing by a high level of knowledge and technological innovation, and work in with internationally approved discreet standards of quality assurance and academic accreditation of corresponding engineering programs with a commitment to ethics of engineering career. 3- learn and understand risk factors surrounding it enabled. 4- learn and understand some of the theoretical principles. 5- To be able subject-specific skills 6- To be able discussion and dialogue. 7- Brain storming by encouraging students to produce a large number of ideas about some issue or problem raised during the job. 8- Self-learning by teaching the student by his own according to his special abilities and mental and cognitive levels responding to his preferences and interests to achieve development and integration of his capabilities. 9- Cooperative learning by team working.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Occupational Safety and importance ;(1 week) Tools and Devices; (1 week) Test methods; (1 week) Design and supply; (2 week) Welding and soldering processes; (2 weeks) Transformers and rectification circuits; (4 weeks) Capacitors and charging and discharging circuits; (3 weeks) Mini projects ; (1 weeks)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	No two days are the same and what might have worked once in a classroom, might not work again. Switching between teaching strategies to suit the needs of the learners is a great way to ensure that the learners are meaningfully engaged and actively participating in the classroom. 1- Visualization is very simply put, the ability to create mental images based on the words we hear or the text that we read. Some of the methods of implementing this strategy in the classroom include: - Use of audio visual aids like photos, videos, audio clips, songs etc - Diagrams, charts and mind maps - Modeling as you teach for the visual learners who might need to see a visual representation to understand as opposed to hearing the concept being explained. 2- Virtual learning has led educators to understand the importance of a key part of the learning process – cooperation. 3- Cooperative learning is an instructional strategy in which a small group of students collaboratively work on a given task. The task can be as simple as solving a quiz or as complex as writing a story.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	53	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #3 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #4 and #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2 and #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the basics occupational Safety and importance and understanding the rules of Electrical Safety Principles.
Week 2	Understanding the principles of resistors and ohms law and design circuits.
Week 3	Understanding the principles of capacitors and the methods of test.
Week 4	Design and supplying charging and dis-charging circuits with required data.
Week 5	Understanding and learning all about AVO meter and how it's used.
Week 6	Understanding the principles of transformer and the methods of test.
Week 7	Design and supplying the rectification circuits.
Week 8	Introduction to; Semiconductors, diode, power diode, zener diode, LED diode; learning about every means
Week 9	Testing all diode types and designing circuits
Week 10	practical work
Week 11	practical work
Week 12	practical work
Week 13	practical work of welding process
Week 14	Work on small mini projects such as design a mini power supply
Week 15	Preparing a report about all subjects including a practical work
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: occupational Safety in workshop
Week 2	Lab 2: how to use tools and devices
Week 3	Lab 3: how to use AVO meter
Week 4	Lab 4: checking the resistors and coding
Week 5	Lab 5: design a parallel and series circuits
Week 6	Lab 6: checking the transformers
Week 7	Lab 7: designing the rectification circuits part 1

Week 8	Lab 8: designing the rectification circuits part 2
Week 9	Lab 9: welding processes: practical exercises
Week 10	Lab 10: soldering processes: practical exercises
Week 11	Lab 11: testing diode and zener diode
Week 12	Lab 12: testing LED diode
Week 13	Lab 13: supplying the mini power supply made by students as a small project

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Technical workshop (Materials & Devices) authored by Mazin N. Ali, 2016. Electrical & Electronics Engineering, Amrita School of Engineering, 2014 Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010	yes
Recommended Texts	Engineering Workshop Data. A Book of Reference containing Data, Formulae, Tables, hints and Recipes relating to all Phases of Engineering Workshop Practice. Hardcover – 1 Jan. 1947.	No
Websites	https://www.slideshare.net/JosephKonnully/workshop-practise	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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	Ministry Of Higher Education & Scientific Research Al-Iraqia University College of Engineering Networks Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	DIGITAL SYSTEMS DESIGN	**Module Delivery**	
Module Type	**CORE**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DISD 1203		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UGI	**Semester of Delivery**	Two
Administering Department	Network Engineering	**College**	Engineering
Module Leader	Samar Kareem Ibrahim	**e-mail**	Samar.kareem90@gmail.com
Module Leader's Acad. Title	ASST. LECTURER	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	LOGIC CIRCUITS DESIGN	**Semester**	One
Co-requisites module	Digital Electronic	**Semester**	Three
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. Learn about various types of combinational logic gates and their functions such as Adders, Subtractors, Comparators, Decoders and Multiplexers. 2. Develop the ability to analyze, design, and implement combinational logic circuits to perform specific functions. 3. Understand the operation and characteristics of latches and flip-flops. 4. Learn about different types of flip-flops, such as D, JK, and T flip-flops. 5. Explore the timing characteristics and applications of latches and flip-flops. 6. Develop the ability to design and implement circuits using latches, flip-flops, and timers. 7. Understand the concept and operation of shift registers. 8. Learn about different types of shift registers, including serial-in-parallel-out, parallel-in-serial-out, and bidirectional shift registers. 9. Explore the applications of shift registers in digital systems. 10. Develop the ability to design and analyze circuits using shift registers. 11. Understand the concept and operation of counters. 12. Learn about different types of counters, such as ripple counters, synchronous counters, and up/down counters. 13. Explore the applications of counters in digital systems, such as frequency division, timing, and control. 14. Develop the ability to design and analyze circuits using counters		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the principles and operations of combinational logic circuits. 2. Analyze and design combinational logic circuits to perform specific functions. 3. Apply Boolean algebra and truth tables to simplify and optimize combinational logic circuits. 4. Implement combinational logic circuits using logic gates and other electronic components. 5. Understand the characteristics and behavior of latches, flip-flops, and timers. 6. Analyze and design circuits using latches, flip-flops, and timers to store and manipulate digital data. 7. Explain the timing characteristics and synchronization techniques related to these devices. 8. Apply latches, flip-flops, and timers in the design of sequential logic circuits. 9. Understand the principles and operation of shift registers. 10. Analyze and design circuits using shift registers for serial data storage, conversion, and manipulation. 11. Apply different types of shift registers in various digital system applications. 12. Demonstrate the ability to cascade shift registers and implement serial-to-parallel and parallel-to-serial data conversion.		

	13. Understand the principles and operation of counters. 14. Analyze and design circuits using counters for counting, frequency division, and sequencing applications. 15. Differentiate between synchronous and asynchronous counters and select appropriate counter configurations for specific requirements. 16. Demonstrate the ability to design and implement cascaded counters and up/down counters.

Indicative Contents المحتويات الإرشادية	1. FUNCTIONS OF COMBINATIONAL LOGIC 2. LATCHES, FLIP-FLOPS, AND TIMERS 3. SHIFT REGISTERS 4. COUNTERS
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Traditional lectures can be used to deliver theoretical concepts and principles related to digital systems design. Lectures can cover topics such as combinational logic, sequential logic, and digital system components. They provide an overview of the subject matter and introduce key concepts and theories. 2. Practical Lab Sessions: Hands-on practical lab sessions are essential for students to gain practical skills in designing and implementing digital systems. These sessions involve working with hardware components, to design and test digital circuits. Students can experiment with different circuit configurations, troubleshoot issues, and gain practical experience. 3. Assessments and Feedback: Regular assessments, such as quizzes, assignments, and exams, can be used to evaluate students' understanding of digital systems design concepts. Providing timely feedback on assessments helps guide students' learning progress and identifies areas for improvement.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1 - 10
	Assignments	2	10% (10)	2, 12	LO # 8 and 15
	Laboratory	1	10% (10)	Continuous	
Summative assessment	**Midterm Exam**	1 hr	20% (20)	8	LO # 1-8
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**6 FUNCTIONS OF COMBINATIONAL LOGIC** 6.1 Half and Full Adders 6.2 Parallel Binary Adders
Week 2	6.3 Ripple Carry and Look-Ahead Carry Adders 6.4 Half and Full Subtractor
Week 3	6.5 Comparators 6.6 Decoders 6.7 Encoders 6.8 Code Converters
Week 4	6.9 Multiplexers (Data Selectors) 6.10 Demultiplexers
Week 5	**7 LATCHES, FLIP-FLOPS, AND TIMERS** 7.1 Latches 7.2 Flip-Flops 7.3 Flip-Flop Operating Characteristics
Week 6	7.4 Flip-Flop Applications
Week 7	7.5 One-Shots
Week 8	**8 SHIFT REGISTERS** 8.1 Shift Register Operations 8.2 Types of Shift Register Data I/Os
Week 9	8.3 Bidirectional Shift Registers
Week 10	8.4 Shift Register Counters

Week 11	**9 COUNTERS** 9.1 Finite State Machines
Week 12	9.2 Asynchronous Counters
Week 13	9.3 Synchronous Counters
Week 14	9.4 Up/Down Synchronous Counters 9.5 Design of Synchronous Counters
Week 15	9.6 Cascaded Counters 9.7 Counter Applications
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Basic Arithmetic Operations: Half Adder
Week 2	Lab 2: Basic Arithmetic Operations: Full Adder
Week 3	Lab 3: Basic Arithmetic Operations: Half Subtractor
Week 4	Lab 4: Basic Arithmetic Operations: Full Subtractor
Week 5	Lab 5: Comparators
Week 6	Lab 6: Multiplexers (Data Selectors)
Week 7	Lab 7: BCD to 7 Segment Display Decoder

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015	
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Arabic Language			**Module Delivery**	
Module Type	Basic learning activities			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ARLA 1206				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr.Anwar Qutaiba Yahya		**e-mail**	E-mail : 83dr.anwar@gmail.com	
Module Leader's Acad. Title	Lecturer Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail : anwar.q.yahya@aliraqia.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1- تعد اللغة العربية وسيلة للتواصل فهي تحمل رسالة بين المتكلمين ،ولكي تكون هذه الرسالة واضحة ومفهومة يجب ان يكون ترتيب مفرداتها حسب التركيب القواعدي لتلك اللغة . ومن هنا برزت وبشكل جلي ضرورة تدريس القواعد أو النحو في كل اللغات 2- تعرف الطالب على مهارات الكتابية والتعبير والوقوف على مواطن الخطأ لتصويب النطق الصحيح 3- إتقان مهارة الكتابة الصحيحة بمعرفة قواعد الإملاء ولاسيما مواضع الاخطاء الشائعة 4- الحفاظ على اللغة العربية كونها لغة القرآن الكريم 5- التعريف بالمبادئ الاساسية للغة العربية من خلال تنمية المهارات الكتابية والتعبير والمحادثة
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-اكتساب الطالب معرفة المفاهيم الاساسية للغة العربية وتطبيقها من خلال الأمثلة 2-معرفة كتابة الكلام الصوتي بشكل مضبوط من حيث الاصوات الصحيحة أو المعتلة 3-دراسة الطالب موضوع العدد ومعرفة كيفية كتابة بالشكل الصحيح 4-يمكن الطالب ايجاد الحلول المناسبة الصحيحة للمشاكل الحقيقية المعقدة تنمية الحس الفكري من خلال أعطاء أمثلة للغة العربية وتطبيقها 5- تكليف الطلبة بكتابة البحوث والتقارير لاختبار مدى استيعابهم للقواعد الأساسية للغة العربية وتطبيقها في حياتهم اليومية
Indicative Contents المحتويات الإرشادية	1- ارشاد الطلبة إلى تكوين خزين معرفي من أنظمة اللغة وأحكامها وقواعدها الاساسية 2-ارشاد الطلبة إلى اكتساب مهارات اللغة الاساسية والتدرب عليها من خلال التطبيق العملي كتابة ونطقا 3-ارشاد الطلبة الى الاطلاع على النصوص من الشعر والنثر بمختلف العصور ومحاكاتها في كتابة النصوص التي تعبر عن حياتهم اليومية ومشاعرهم وعواطفهم الذاتية 4-ارشاد الطلبة إلى ما يؤدي الى تعزيز مهاراتهم والانتقال به الى مستوى التفكير العالي 5-ارشاد الطلبة من خلال تعبير عن افكارهم من خلال تكوين مجموعات والتنافس بينهم

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1-افضل طريقة في تعليم الطلبة النحو العربي لاهميته في تعلم هذه اللغة واهميته في الترجمة، هي اتباع مبدأ التعاون في التعلم . على ان يتعاون الطلاب في تهيأة مادة الدرس وتقديمها بعد تقسيمهم الى مجاميع تهتم كل مجموعة بجانب مادة الدرس . 2-القاء المحاضرات النظرية بشكل افتراضي مباشرة على السبورة 3-عمل بحوث وتوزيعها على مجاميع طلابية لمعرفة فهمهم للمادة او ادراكهم لها 4-ان الطريقة الاستقرائية باستنباط القاعدة من الامثلة تعد ناجحة في تدريس النحو 5-اهم طرائق التعلم والتعليم هي استراتيجية مهارات التفكير ضمن مجموعة 6- استراتيجية التفكير الناقد في التعلم ، ايضا من اهم طرائقه العصف الذهني

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مقدمة عن علامات الترقيم والتعرف على أنواعها
Week 2	كتابة أنواع الهمزة (همزة القطعوالوصل ، همزة المتوسطة ، همزة المتطرفة)
Week 3	مكملات ضوابط الكتابة (التنوين ،والشدة ، المدة) والتعرف على أنواع الأخطاء اللغوية
Week 4	موضوع العدد وطريقة كتابته
Week 5	الخط العربي وأنواعه
Week 6	المشتقات (اسم الفاعل ، اسم المفعول ، اسما الزمان والمكان ، اسم الآلة)
Week 7	الفعل وأنواعه
Week 8	الفاعل والمفعول به

Week 9	أنواع المفاعيل امتحان مد
Week 10	المبتدأ والخبر
Week 11	المثنى والجمع وأنواعه
Week 12	الفرق بين التاء والهاء
Week 13	التذكير والتأنيث وأنواعها
Week 14	المعلقات
Week 15	مراجعة للطلاب قبل المتحان النهائي
Week 16	الاختبارات النهائية

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	الوجيز في اللغة العربية ، محي هلال سرحان ، شرح قطر الندى وبل الصدى،لابن هشام الانصاري ، الاجرومية ابي عبدالله محمد الصنهاجي الاملاء والترقيم في الكتابة العربية ،عبد العليم ابراهيم ، اللغة العربية لغير المختصين ،مصطفى جطل وصلاح كزارة	Yes
Recommended Texts	جامع الدروس العربية ، مصطفى الغيلاني ،معاني النحو ، فاضل السامرائي دراسة في قواعد الاملاء د.عبد الجواد الطيب ، موسوعة الشامل في الكتابة والاملاء ،موسى حسن الهديب	No
Websites	1. https://shamela.ws/ 2. https://waqfeya.net/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COMM2202				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		2	**Semester of Delivery**		1
Administering Department		Network engineering	**College**	College of engineering	
Module Leader	Zahraa Khduair Taha		**e-mail**	Zahraa.Khduair @aliraqia.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Communication I	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. understanding of the Concept of data compression, entropy, and compressibility 2. know different types of coding 3. how can perform text/ image code
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying signal coding and theory. 2. Determine the appropriate compression method for a given signal/data. 3. Realize the compression according to the lossy/ lossless requirements. 4. Understanding of image/text coding
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Concept of data compression Entropy and compressibility Shannon and Huffman codes arithmetic coding Sequence coding. Prediction. Mid-term Exam quantization and its optimization. Vector quantization Signal spaces Wavelet transforms Bit assignment and coding efficiency. Image/sound/video coding Text coding

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Digital Communication Strategies: 1. Signal Conditioning: Digital signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Bandwidth Optimization: Digital signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth.

	3. Noise Reduction: Digital signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	1, 2 and 3	LO #1, #2 and #3
	Assignments	2	10% (10)	2, 3 and 4	LO #2, #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Concept of data compression
Week 2	Entropy and compressibility
Week 3	Shannon and Huffman codes
Week 4	arithmetic coding

Week 5	Sequence coding.
Week 6	Prediction.
Week 7	Mid-term Exam
Week 8	quantisation and its optimisation.
Week 9	Vector quantization
Week 10	Signal spaces
Week 11	Wavelet transforms
Week 12	Bit assignment and coding efficiency.
Week 13	Image/sound/video coding
Week 14	Text coding (part1)
Week 15	Text coding (part2)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: data compression
Week 2	Lab 2: Shannon and Huffman codes
Week 3	Lab 3: Arithmetic coding.
Week 4	Lab 4: Sequence coding.
Week 5	Lab 5: wavelet transform
Week 6	Lab 6: Text coding
Week 7	Lab 7: image coding

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Signal Coding and Processing, 2nd edition, 2012	Yes
Recommended Texts	Multimedia Signal Coding and Transmission	No
Websites	https://www.coursera.org/learn/ coding	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Network I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CONE 2204				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	2	
Administering Department	NETWORK		**College**	ENGINEERING	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course covers various aspects of networking, including the introduction to networking, networking devices, networking protocols, different layers of the OSI model, network addressing, network security, troubleshooting, router configuration, home networking, and concludes with a networking capstone project and a final exam.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn the basic and applied concepts of Computer Network with the following fundamentals: 1. Define and explain the concept of networking, including its historical development and importance in modern technology. 2. Identify and describe different types of networks, such as LANs, WANs, and MANs, and understand their characteristics and uses. 3. Recognize and explain the functions and features of networking devices, including routers, switches, and hubs. 4. Understand and apply various networking protocols, such as those based on the OSI and TCP/IP models, and explain their role in network communication. 5. Configure and troubleshoot networking devices, including routers, switches, and hubs, to ensure proper connectivity and functionality. 6. Implement network security measures, including firewalls, intrusion detection systems, and encryption, to protect network resources and data. 7. Apply troubleshooting methodologies based on the OSI model and TCP/IP model to diagnose and resolve network issues. 8. Configure network addressing using IPv4, including subnetting and Variable Length Subnet Masking (VLSM), to optimize IP address allocation. 9. Demonstrate knowledge of different network cable types, such as Ethernet, fiber optic, and coaxial cables, and their appropriate usage. 10. Design and implement a network using static and dynamic routing protocols, considering factors such as scalability and efficiency. 11. Manage and monitor networking environments, including DHCP and DNS protocol configuration, to ensure smooth network operation. 12. Configure VLAN networks to segregate and manage network traffic efficiently. 13. Understand and follow Cisco router configuration using Command-Line Interface (CLI) commands. 14. Implement and secure home networks, including selecting appropriate devices and implementing security measures. 15. Design and implement a networking capstone project that demonstrates the integration of networking concepts and skills.
Indicative Contents	The student will learn the basic and applied concepts of Computer Network with the following fundamentals:

المحتويات الإرشادية	
	• Definition and importance of networking • Historical development of networking • Types of networks: LANs, WANs, MANs • Functions and features of routers • Functions and features of switches • Functions and features of hubs • Overview of the OSI model • Overview of the TCP/IP model • Explanation of common networking protocols • Functionality and protocols of the OSI application layer • Detailed study of application layer protocols like HTTP, SMTP, FTP • Functionality and protocols of the OSI transport layer • Comparison of TCP and UDP protocols • Role and responsibilities of the OSI network layer • Introduction to IPv4 and IPv6 addressing • IP address allocation and subnetting techniques • Assigning IPv4 classes • Subnetting and Variable Length Subnet Masking (VLSM) • Functions and protocols of the OSI data link layer • Introduction to MAC addresses, Ethernet, and VLANs • Functions and protocols associated with the OSI physical layer • Overview of Ethernet, fiber optic, and coaxial cables • Introduction to network security and its components • Configuring firewalls • Implementing intrusion detection systems • Encryption techniques and protocols • Troubleshooting methodologies based on the OSI model • Troubleshooting TCP/IP-related issues • Network device troubleshooting techniques • Introduction to the Cisco command-line interface (CLI) and commands • Configuration of interface ports on Cisco routers • Configuration of line ports (console, Telnet, SSH) • Configuring static routes • Setting up DHCP and DNS protocols • Selection and setup of home networking devices • Implementation of home networking security measures • Design and implementation of a comprehensive networking project

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class.

	2. Flip class 3. Assignment, project and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Networking** • What is networking? • The history of networking • The different types of networks
Week 2	**Networking Devices** • Routers: Functions and features

	• Switches: Functions and features • Hubs: Functions and features
Week 3	**Networking Protocols** • The OSI model: Overview and its layers • The TCP/IP model: Overview and its layers
Week 4	**OSI Application Layer** • Functionality and protocols of the OSI application layer • Detailed study of application layer protocols like HTTP, SMTP, FTP
Week 5	**OSI Transport Layer** • Functionality and protocols of the OSI transport layer • Comparison of TCP and UDP protocols
Week 6	**OSI Network Layer and IP Addressing** • Role and responsibilities of the OSI network layer • Introduction to IPv4 and IPv6 addressing
Week 7	**Midterm Exam+** IP address allocation and subnetting techniques
Week 8	**Network Addressing (IPv4)** • Assigning IPv4 classes • Subnetting and Variable Length Subnet Masking (VLSM)
Week 9	**OSI Datalink Layer** • Functions and protocols associated with the OSI Datalink Layer
Week 10	**OSI Datalink and Physical Layer** • Functions and protocols associated with the OSI Physical Layer • Overview of Ethernet cables and their categories (e.g., Cat5, Cat6) • Fiber optic cables and their advantages • Coaxial cables and their applications
Week 11	**Networking Troubleshooting** • Troubleshooting methodologies based on the OSI model • Troubleshooting TCP/IP-related issues • Network device troubleshooting techniques
Week 12	**Router Cisco Configuration** Introduction to the Cisco command-line interface (CLI) and commands Configuration of interface ports on Cisco routers
Week 13	**Router Cisco Configuration cont.** Configuration of line ports (console, Telnet, SSH) Configuring static routes Setting up DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name System) protocols on routers
Week 14	**Networking in the Home** • Introduction to home networking devices (e.g., routers, switches, wireless access points) Configuration and setup of home networks • Implementation of home networking security measures (e.g., network encryption, password protection, firewall settings)
Week 15	**Networking Capstone Project** • Design and implementation of a comprehensive networking project, integrating concepts and skills learned throughout the course.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Topology Orientation and Building a Small Network Topology Diagram.
Week 2	Lab 2: Cabling a Network and Basic Router Configuration
Week 3	Lab 3: Router configuration.
Week 4	Lab 4: Using ping command, configure Lan Network and applied subnetting.
Week 5	Lab 5: Configure VLan Networks
Week 6	Lab 6: Design Network With static and dynamic routing protocol
Week 7	Lab 7: Configure DHCP and DNS protocol

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Title: Networking: The Complete Reference Author: Todd Lammle	No
Recommended Texts	Title: Cisco CCNA: Routing and Switching Study Guide Author: Wendell Odom	No
Recommended Texts	Title: Network Security: A Beginner's Guide Author: Stuart McClure	NO
Recommended Texts	Title: Cisco IOS Configuration Fundamentals Command Reference Organization: Cisco Systems Inc.	NO
Websites	https://www.cisco.com/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Ministry Of Higher Education & Scientific Research
Al-Iraqia University
College of Engineering
Networks Engineering Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Programming ||**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COPO 2205**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII (2)	**Semester of Delivery**		FOUR (2)
Administering Department		NETWORK	**College**	ENGINEERING	
Module Leader	Aya Ayad Hussein		**e-mail**	aya.ayad.it@gmail.com	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.sc
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name (if available)	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COPR 1205	**Semester**	TWO
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course is designed for those who are new to programming and want to learn the Python programming language. The course will cover the basics of Python programming including data types, flow control, functions, and modules. The course will also cover advanced topics such as object-oriented programming and working with external libraries.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students should be able to: 1. Understand the basic principles of computers. 2. Understand the basics of binary computation. 3. Understand the programming basics (operations, control structures, data types, etc.) 4. Readily use the Python programming language 5. Apply various data types and control structures. 6. Understand class inheritance and polymorphism. 7. Understand object-oriented program design and development. 8. Understand and begin to implement code. 9. write simple programs using Python. 10. use advanced features of Python such as object-oriented programming and working with external libraries.
Indicative Contents المحتويات الإرشادية	• Acquire programming skills in core Python. • Acquire Object-oriented programming skills in Python. • Develop the skill of designing graphical user interfaces (GUI) in Python. • Develop the ability to write database applications in Python. • Acquire Python programming skills to move into specific branches - Internet of Things (IoT), Data Science, Machine Learning (ML), Artificial Intelligence (AI), etc.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is taught using a combination of lectures, demonstrations, and tutorials. The demonstrations and tutorials focus on getting learners up to standard in practical application development. The lectures supply the necessary theoretical background through Lecturing offline mode in class, Assignments, projects, and quizzes, Hands-on and interactive activities.

	In a fast-changing technology field learners are expected under guidance to engage in research in relation to the different technologies and products available.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #3, #4 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #5 and #7, #8, #9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8 and #9
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Python** • Relationship between computers and programs • Basic principles of computers • File systems
Week 2	**Introduction to Python (continued)** • Using the Python interpreter

	• Introduction to binary computation • Input / Output
Week 3	**Data types and control structures** • Operators (unary, arithmetic, etc.) • Data types, variables, expressions, and statements • Assignment statements
Week 4	**Data types and control structures (continued)** • Strings and string operations • Control Structures: loops and decision
Week 5	**Modularization and Classes** • Standard modules • Packages • Defining Classes
Week 6	**Modularization and Classes (continued)** • Defining functions • Functions and arguments (signature)
Week 7	**Exceptions and data structures** • Data Structures (array, List, Dictionary)
Week 8	**Exceptions and data structures (continued)** • Error processing • Exception Raising and Handling
Week 9	**Dictionaries and Sets**
Week 10	**Dictionaries and Sets**
Week 11	**Mid - exam**
Week 12	**Object-oriented design** • Programming types • Object Oriented Programming
Week 13	**Object-oriented design** • Object Oriented Design • Inheritance and Polymorphism

Week 14	**Inheritance**
Week 15	**Inheritance**
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1: begin:** • Installation and setup of Python • Basic syntax and data types
Week 2	**Lab 2: Operators and Control Structures:** • Read a list of numbers and write a program to check whether a particular element is present or not using membership operators. • Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elif…else statement.
Week 3	**Lab 3: LIST And TUPLE:** • Read a list of numbers and print the numbers divisible by x but not by y • Read a list of numbers and print the sum of odd integers and even integers from the list. • Given a list of tuples. Write a program to find tuples that have all elements divisible by K from a list of tuples.
Week 4	**Lab 4: Set and Dictionary:** • Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x). • Write a program to do the following operations: ▪ Create an empty dictionary with the dict() method ▪ Add elements one at a time.

	▪ Update the existing key's value. ▪ Access an element using a key and also get () method.
Week 5	**Lab 5: Strings And User Defined Functions** • Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears the same when read forward or backward. • A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.
Week 6	**Lab 6: BUILT-IN FUNCTIONS** • Write a program to demonstrate the working of built-in statistical functions mean(), mode(), and median() by importing statistics library. • Write a program to demonstrate the working of built-in trigonometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module. • Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module. • Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module. •
Week 7	**Lab 7: (Class And Objects) And Miscellaneous Programs** • Write a program to create a BankAccount class. Your class should support the following methods for ▪ Deposit - Withdraw – GetBalanace – PinChange • Write a program to find the maximum and minimum K elements in Tuple using slicing and sorted() method (Input: test_tup = (3, 7, 1, 18, 9), k = 2, Output: (3, 1, 9, 18))

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Starting Out with Python plus MyProgrammingLab with Pearson eText --Access Card Package (3rd (3rd Edition) Tony Gaddis ISBN-13: 978-0133862256"	Yes
Recommended Texts	“Python Distilled” , David M. Beazley	Yes
Websites	Introduction to Python Programming | Coursera	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Database Systems**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DASY 2203				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	NE		**College**	Type College Code	
Module Leader	Sura Nasser Maryoush		**e-mail**	Suranasser16@yahoo.com	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	MSC	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the different issues involved in the design and implementation of a database system 2. To study the physical and logical database design, and data models. 3. To understand the basic concepts of relational data model 4. To understand and use SQL with relational databases 5. To be able to retrieve specific data from a database by using queries and subqueries . 6. To manipulate data by using SQL. 7. To Be able to understand and create E/R diagrams 8. To understand and implement database applications 9. To Be able to normalize databases and tables 10. To understand indexing and hashing methods
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the importance of database systems 2. Have a broad understanding of database concepts and database management systems 3. Understand the relational data model and be able to write schema, and draw the schema diagram 4. Be able to reason about dependencies in a relational schema 5. Use relational query languages such as SQL 6. Write SQL queries for a given context in relational databases 7. Analyze the problems and Be able to create E/R diagrams and specify the relation between the entities to represent simple database application scenarios. 8. Understand normal forms, and the decomposition process by which normal forms are obtained 9. Understand indexing methods including B+ tree, and Hashing 10. Be able to design and implementation of a database for a real world application
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • File system, file system limitations • Databases, database management systems, DBMS responsiblities, DBMS advantages, levels of abstraction • Relational data model: the design terms, properties, attributes, records, keys, schema, schema diagram, instances. • Relational algebra and calculus • SQL: basic commands, table modification commands, queries on single or multiple relations, natural join, rename operation, string operations, set operations (intersect, union, except), null values, aggregation functions, grouping, having clause, subqueries, data modification commands (insert, update, delete), views, integrity constraints, authorization and privileges. • Entity- relationship data model: entities, attributes types, relations, E/R diagram representation, weak entity, strong entity.

	• Normalization: 1NF, 2NF, 3NF • Indexing: sparse Indexing, dense Indexing, multilevel Indexing, B+ tree, hashing, dynamic hashing, static hashing, operation in hashing.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and developing skills. This will be achieved through classes, interactive discussions and by considering types of simple practical implementing of codes and programs: • Theory based lectures: the traditional classroom lectures are used to present models, topics, concepts, and methods of database systems, which will be explained by examples, also, the students will be engaged in discussions to foster understandings . • Laboratary experiments: in the laboratary session, the students will be able to use the available softwares to create, implement, and modify databases and tables of any field of life , and be familiar with database implementation issues, also gain problem solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 11	LO #1, #2, #3,#4 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #1, #2,#3 and #7, #8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to databases, file systems, databases, DBMS, levels of abstraction
Week 2	Data models, relational data model, schema and schema diagram.
Week 3	Relational algebra and calculus.
Week 4	Introduction to SQL , Basic SQL commands
Week 5	simple Queries from single and multiple relation, natural join
Week 6	Additional basic operations, set operations, Null values in SQL
Week 7	Mid exam + Aggregation functions
Week 8	Aggregation functions with grouping in SQL, Having clause with grouping
Week 9	nested subqueries in SQL, set membership, set comparison, subqueries in the From Clause
Week 10	Modification on the database commands , views in SQL.
Week 11	Integrity constraints, authorization in SQL
Week 12	Database application development, connecters.
Week 13	Entity – Relationship data model, mapping cardinalities, E/R diagram representation
Week 14	Database Normalization, 1NF, 2NF, 3NF
Week 15	Indexing and Hashing
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Mysql workbench, installing and creating server connections
Week 2	Lab 2: creating database and tables, insert, delete, update data and tables using Mysql workbench
Week 3	Lab 3: creating Database and tables using SQL
Week 4	Lab 4: queries on data using SQL
Week 5	Lab 5: queries on more than one table, using natural join in queries
Week 6	Lab 6: applying basic operation in SQL
Week 7	Lab 7: applying set operation on data using SQL
Week 8	Lab 8: using aggregation functions to retrieve data in SQL
Week 9	Lab 9: subqueries in SQL
Week 10	Lab 10: data modification on data tables using SQL
Week 11	Lab 11: view creation by using SQL
Week 12	Lab 12: integrity constraints and privileges of the database using SQL
Week 13	Lab 13: E/R diagram construction using Mysql Workbench

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Database System Concepts ", Abraham Silberschatz, Henry F. Korth,S. Sudarshan, 7th edition 2020 , ISBN 978-0-07-802215-9 • "Fundamentals Of Database Systems", ramez elmasri, shamkant b. navathe, seventh edition, 2016, ISBN-13: 978-0-13-397077-7	No
Recommended Texts	"Database Management Systems", Raghu Ramakrishnan, third edition, 2003	No
Websites	www.mysql.com https://www.w3shool.com	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics IV**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	Code			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Omar Hassan Hameed		**e-mail**	Omar.Hassan @aliraqia.edu.iq	
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics I	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of complex numbers and their properties. 2. Understand the differentiation and integration of inverse trigonometric functions. 3. Understand the differentiation and integration of hyperbolic trigonometric functions. 4. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 5. Identify integration applications such as Area under curve and area between two curves. 6. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 7. Understand polar coordinates and their properties. 8. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part • Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve

	• Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties • Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5

	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Ordinary differential equation – first order- variable separable
Week 2	Ordinary differential equation – first order- homogenous
Week 3	Ordinary differential equation – first order- Exact
Week 4	Ordinary differential equation – first order - Linear
Week 5	Ordinary differential equation – second order – undetermined coefficient
Week 6	Ordinary differential equation – second order – variation of parameter
Week 7	Ordinary differential equation – higher order
Week 8	**Mid-term Exam**
Week 9	Laplace transform - properties
Week 10	Inverse Laplace transform
Week 11	Solving Ordinary differential equation using Laplace transform
Week 12	Z - transform
Week 13	Z - transform properties
Week 14	Inverse Z - transform
Week 15	Inverse Z – transform (PART2)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**OPERATING SYSTEMS AND NETWORKS**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	OPSA 2206				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	UGII		**Semester of Delivery**	FOUR	
Administering Department	NETWORK ENGINEERING DEPARTMENT		**College**	COLLAGE OF ENGINEERING	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	At the end of this course, the learner should be able to: 1. provide users with a convenient interface to use the computer system. 2. act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources. 3. manage the resources of a computer system. 4. To make the computer system convenient to use in an efficient manner. 5. hide the details of the hardware resources from the users. 6. provide users with a convenient interface to use the computer system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Understanding Operating System Concepts:** • Gain a solid understanding of operating system fundamentals, including process management, memory management, file systems, and device management. • Learn about the different types of operating systems, their characteristics, and their role in managing computer resources . **2. Windows Operating System:** • Acquire comprehensive knowledge of the Windows operating system architecture, features, and functionalities. • Learn to navigate and configure the Windows user interface and manage system settings. • Develop skills in installing, configuring, and maintaining Windows operating systems. • Gain proficiency in managing user accounts, file systems, and security settings in Windows. • Learn to troubleshoot common issues and perform system optimizations in Windows. **3. Linux Operating System:** • Understand the Linux operating system structure, including the kernel, shell, and file system. • Gain practical experience with Linux distributions (e.g., Ubuntu,

	CentOS) and their installation and configuration. • Learn command-line operations and common Linux utilities for system administration tasks. • Develop skills in managing user accounts, permissions, and file systems in Linux. • Explore Linux networking, security, and shell scripting. **4. Operating System Administration:** • Learn the principles of operating system administration, including system monitoring, performance optimization, and troubleshooting techniques. • Understand the concepts of system backup and recovery, software installation, and updates. • Gain knowledge of system security practices, including user authentication, access control, and auditing. **5. Application Software:** • Understand the role and functionality of various application software in an operating system environment. • Learn to install, configure, and manage common productivity tools such as office suites, web browsers, and email clients. • Develop skills in troubleshooting application issues and ensuring software compatibility.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Operating Systems:** • Definition and purpose of operating systems • Evolution of operating systems • Types of operating systems (batch, multi-programming, multi-tasking, real-time, etc.) 2. Windows Operating System: • Overview of Windows operating system versions (Windows 10, Windows Server) • Windows file system and directory structure • Windows user interface and customization options • Windows system administration and management tools • User account management and permissions in Windows • Windows networking and network services 3. Linux Operating System: • Introduction to Linux distributions (Ubuntu, CentOS, Fedora, etc.) • Linux file system hierarchy • Command-line operations and basic shell scripting • User and group management in Linux • Linux networking and network configuration

	• Linux security and access control 4. Process Management: • Process concepts and process states • Process scheduling algorithms • Process synchronization and inter-process communication • Process management in Windows and Linux 5. Memory Management: • Memory hierarchy and virtual memory • Memory allocation and deallocation techniques • Paging and segmentation • Memory management in Windows and Linux 6. File Systems: • File system organization and structure • File operations and file access methods • File system implementation and management • File system security and permissions in Windows and Linux 7. Device Management: • Device drivers and device management in Windows and Linux • Input/output operations and techniques • Disk management and storage technologies • Printers and printing management in Windows and Linux 8. Application Software: • Introduction to common application software (office suites, web browsers, email clients, etc.) • Installation and configuration of application software • Troubleshooting common application issues • Compatibility and interoperability of applications across operating systems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Flip class 3. Assignment, and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)		LO #1, #2 and #10, #11
	Assignments	2	10% (10)		LO #3, #4 and #6, #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** 1. What is an Operating System? 2. Functions of Operating Systems 3. Operating System Types 4. Windows OS 5. Linux OS
Week 2	**OS structures** 1. Computer hardware properties 2. Disk subsystems
Week 3	**Virtual memory management**

	1.Demand Paging (Advantages – Disadvantages) 2.Page Fault Service Time 3.Swapping 4.Thrashing 5.Performance in Virtual Memory 6.Frame Allocation 7. Paging Policies
Week 4	**CPU Scheduling algorithms** 1.First Come First Serve (FCFS) 2.Shortest Job Next (SJN) 3.Priority Based Scheduling 4.Shortest Remaining Time 5.Round Robin Scheduling 6.Multiple-Level Queues Scheduling
Week 5	**File systems** 1.Attributes 2.Types 3.Operations 4.FILE DIRECTORIES 5.SINGLE-LEVEL DIRECTORY 6.TWO-LEVEL DIRECTORY 7.TREE-STRUCTURED DIRECTORY 8.FILE ALLOCATION METHODS 9.Disk Free Space Management
Week 6	**Clouds & Virtualization** 1.The Cloud Concept 2.Virtualization
Week 7	**Disaster Recovery -DR** 1.Introduction 2.Disasters Types 3.Disaster Recovery Planning 4.Alternative Work Sites
Week 8	**Data Centers- DCs:** 1.Introduction 2.General Structure Of DC 3.Basis DCs Standards 4.Networking Structure 5.Cabling Structures in DCs
Week 9	**Process concept in moldering OS** 1.Need for Five-State Process Model 2.Execution of Process in Two-state Model 3.Possible State Transitions
Week 10	**Multi-processes** 1.Introduction 2.What is a Multiprocessing Operating System? 3.Types of Multiprocessing OS 4.Working of Operating System 5.Multiprogramming and Multiprocessing Operating System

Week 11	**Process synchronization** 1.Critical section problem 2.Classical problem
Week 12	**Shell and Shell scripting** 1.Introduction Operating system shells 2.Types of Shells in Operating Systems 3.Shell Scripting
Week 13	**Concurrent programming.** 1.Introduction 2.Principles of Concurrency 3.Concurrency Mechanisms 4.Problems in Concurrency 5.Real-World Applications of Concurrency 6.Future Directions for Concurrency in Operating Systems
Week 14	**Secondary memory management and file systems** 1.What Is Secondary Storage Management 2.What Are Secondary Storage Devices In Operating System 3.What Is the Function of Secondary Storage Management? 4.The Different Storage Devices for Your Compute 5.Examples. 6.Secondary Storage Management in Android
Week 15	**Linux Kernel** 1.Define Linux Kernel 2.What is Linux Operating System and Kernel 3.Figure
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free.	Yes

Recommended Texts	Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commons BY-NC-SA	No
Websites	https://books.google.iq/books/about/Operating_Systems.html?id=0a-ouwEACAAJ&redir_esc=y	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Advance Mathematics II			**Module Delivery**	
Module Type	B			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ADMA 3201				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	2	
Administering Department	Networks engineering		**College**	College of engineering	
Module Leader			**e-mail**	@aliraqia.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Advance Mathematics I (probability)	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. **Develop computational skills**: Numerical analysis equips engineering students with skills to use and develop numerical methods, algorithms, and computational techniques for solving mathematical problems. This includes solving algebraic and transcendental equations, integration, differentiation, and differential equations, which are commonly encountered in engineering. 2. **Understanding error analysis**: Error analysis is crucial in numerical methods. Engineers need to understand the source of errors, how to minimize them, and how to estimate the error in a given solution. Understanding and managing numerical errors can make a significant difference in the reliability and accuracy of engineering designs. 3. **Modeling and Simulation**: Numerical analysis aids in the development and improvement of mathematical models and simulations. This is critical in engineering as it allows for the prediction of system behavior before implementation, thus saving resources and increasing efficiency. 4. **Interpolation and Approximation**: Engineers often need to work with discrete data points and infer a continuous function. Numerical analysis aims to provide an understanding of various techniques for interpolation and approximation of functions. 5. **Solving complex systems of equations**: Engineers frequently encounter large, complex systems of equations, especially in fields like structural or electrical engineering. Numerical analysis provides efficient methods to solve such systems, which would be difficult or impossible to solve analytically. 6. **Optimization**: Many engineering problems involve finding an optimum solution, such as minimizing costs or maximizing efficiency. Numerical analysis provides the theoretical background for optimization algorithms. 7. **Understanding limitations of numerical methods**: Not every problem can be solved with every method, and every method has its limitations. Numerical analysis aims to help understand when to apply which method and what to expect from it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Roots Finding Methods - Bisection and Newton-Raphson: a. Understand the concepts and principles of bisection and Newton-Raphson methods. b. Apply these methods to find the roots of equations. c. Analyze the convergence and accuracy of these methods. 2. Roots Finding Methods - Secant and Fixed Point: a. Understand the concepts and principles of the secant and fixed point methods. b. Apply these methods to find the roots of equations. c. Evaluate the advantages and limitations of these methods. 3. Curve Fitting - Introduction and Least Square Regression Line: a. Understand the concept and importance of curve fitting. b. Apply the least square regression line method to fit a straight line to a given set of data points. c. Interpret the parameters of the regression line and assess the quality of the fit. 4. Interpolation - Newton, Lagrange, and Hermit: a. Understand the concept and purpose of interpolation. b. Apply the Newton's forward, backward, and divided differences

	methods for interpolation. c. Apply the Lagrange polynomial and Hermit interpolation methods for interpolation with unevenly spaced data points. 5. Interpolation - Spline Interpolation: a. Understand the concept and advantages of spline interpolation. b. Apply spline interpolation methods to approximate a function using piecewise polynomials. c. Evaluate the smoothness and accuracy of spline interpolation. 6. Numerical Differentiation: a. Understand the concept and importance of numerical differentiation. b. Apply numerical differentiation methods, such as finite differences, to approximate derivatives. c. Assess the accuracy and limitations of numerical differentiation. 7. Numerical Integration - Trapezoidal, Simpson 1/3, and Simpson 3/8 Rules: a. Understand the concept and purpose of numerical integration. b. Apply the trapezoidal, Simpson 1/3, and Simpson 3/8 rules to approximate definite integrals. c. Analyze the accuracy and convergence of these numerical integration methods. 8. Numerical Solutions of ODEs - Euler Method and Runge-Kutta Method: a. Understand the concept of numerical solutions for ordinary differential equations (ODEs). b. Apply the Euler method and Runge-Kutta methods to approximate solutions of ODEs. c. Evaluate the accuracy and stability of these numerical methods. 9. Numerical Solutions of Linear Systems - Gauss-Elimination, Gauss-Seidel, and Jacobi Methods: a. Understand the concept and importance of numerical solutions for linear systems. b. Apply the Gauss-Elimination, Gauss-Seidel, and Jacobi methods to solve linear systems. c. Assess the efficiency, accuracy, and convergence of these numerical methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. <u>Introduction to Numerical analysis</u> Basic principles in numerical analysis Types and most common errors 2. <u>Roots finding solutions</u> Bisection method Newton – Raphson method Secant method Fixed point method 3. <u>Curve fitting</u> • Least square regression line • Interpolation

	Newton (Forwards , Backwards , divided differences) Lagrange polynomial Hermit interpolation Spline interpolation 4. Numerical Differentiation 5. Numerical Integration (Trapezoidal , Simpson 1⁄3 , Simpson 3⁄8) rules 6. Numerical Solutions of ordinary differential equation (Euler and Runge – Kutta) methods. 7.Numerical Solutions of linear systems (Gauss elimination , Gauss Seidel , Jacobi) .

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Student acquiring a general definition of numerical analysis and how to apply it in other sciences, studying the numerical methods used in the solutions of differential equations and linear and nonlinear systems, being able to deal with functions and their derivatives and integrals in an integrated analytical context, the ability to link vital topics to numerical analysis and find potential solutions for them, real or hypothetical

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (15)	3,7and12	LO #3 , #5 and #9
	Assignments	2	15% (15)	1 and 5	LO #1 , #2 and #3
	Projects / Lab.				
	Report	1	10%(10)	11, 12 and 13	LO #8 and #9
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #5
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Literature review, errors , Roots finding (Bisection / Newton – Raphson) methods
Week 2	Roots finding (Secant / Fixed point) methods
Week 3	Curve Fitting : Introduction , Least square regression line
Week 4	Least square regression line : the best fit
Week 5	Interpolation : Newton (Forwards , Backwards , divided differences)
Week 6	Interpolation : Lagrange polynomial , Hermit interpolation
Week 7	Interpolation : Spline interpolation
Week 8	Mid exam
Week 9	Numerical Differentiation
Week 10	Numerical Integration : (Trapezoidal , Simpson 1⁄3 , Simpson 3⁄8) rules
Week 11	Numerical Solutions of ODE′s : Euler Method , Runge - Kutta Method
Week 12	Numerical Solutions of Linear Systems : Gauss – elimination
Week 13	Numerical Solutions of Linear Systems : Gauss – Seidel
Week 14	Numerical Solutions of Linear Systems : Jacobi method
Week 15	Term exam + tutorial
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1-Advanced engineering mathematics by Erwin Krizge	yes
Recommended Texts	1. Numerical methods by Babu Ram. 2. Applied mathematics journals, schaum series in numerical analysis	no
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	COMPUTER NETWORK			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CONE 3206				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	Four	
Administering Department	Network		**College**	Engineering	
Module Leader	.satea hikmat alnajja		**e-mail**	E-mail	
Module Leader's Acad. Title	assit.prof.dr		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course studies the standard models for the layered approach to communication in a network, and the main characteristics of data transmission across various physical link types. It considers how to design networks and protocols for diverse situations, analyses several application and support protocols from a distributed systems viewpoint, and identifies significant problem areas in networked communications
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Giving students a clear picture of how network applications are the raison of the computer network. 2. Understand and describe the layered model. 3. Conceptual, implementation aspects of network application protocols, furthermore examining popular application-level protocols 4. Understand how two entities can communicate reliably over an intermediary that may lose and corrupt data. Through a series of increasingly complex (and realistic!) scenarios, we'll show in another course how these principles are embodied in TCP, the Internet Connection-Oriented Transport Protocol. 5. Learn exactly how the network layer implements the host-to-host communication service. Also a study of the network services it can provide. We'll then examine structuring network-layer packet delivery—the datagram and the virtual-circuit model and see the fundamental role that addressing plays in delivering a packet to its destination host. 6. Giving an understanding of the nature of wireless and mobile networks is vital for a discussion of wireless links,, and networks, and their relationship to the larger networks they connect.

Indicative Contents المحتويات الإرشادية	In the fourth stage of studying Computer Network II, you will typically explore more advanced topics related to computer networks and their operation. Building upon the foundational knowledge acquired in earlier stages, here are some indicative contents you may encounter: Network Address Translation (NAT): - NAT types and their applications (Static NAT, Dynamic NAT, PAT) - NAT traversal techniques - NAT overload and its implications - NAT and IPv6 transition mechanisms Virtual Local Area Networks (VLANs): - VLAN concepts and benefits - VLAN tagging (802.1Q) Network Troubleshooting: - Troubleshooting methodologies and best practices - Network diagnostic tools (ping, traceroute, nslookup, etc.) - Packet capture and analysis (Wireshark) - Common network issues and their resolution Network Virtualization: - Virtual networks and overlays - Virtual switches and routers

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Flip class 3. Assignment, project and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0% (0)	-	-
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Computer Networks and the Internet, A Services Description , Network Edge, handshaking protocol.
Week 2	Access Networks, Access in the Enterprise (and the Home): Ethernet and Wi-Fi, Wide-Area Wireless Access: 3G and LTE Protocol Layers and Their Service Models, layered Architecture, Encapsulation.
Week 3	The Network Core, Packet Switching, Store-and-Forward Transmission, Queuing Delays and Packet Loss, Circuit Switching.
Week 4	Multiplexing in Circuit-Switched Networks frequency-division multiplexing (FDM) and time-division multiplexing (TDM).
Week 5	Packet Switching Versus Circuit Switching, Delay, Loss, and Throughput in Packet-Switched Networks, Delay in Packet-Switched Networks
Week 6	Types of Delay, Processing Delay, Queuing Delay, Transmission Delay, Propagation Delay, Queuing Delay and Packet Loss, Packet Loss, End-to-End Delay, Throughput in Computer Networks
Week 7	Midterm + Application-Layer Protocols, round-trip time (RTT) RTT , HTTP Message Format , HTTP Request Message HTTP Response Message , The Conditional GET and POST mouthed
Week 8	Transport Services Provided by the Internet, TCP Services,UDP Services, Overview OF DNS.

Week 9	User-Server Interaction: Cookies, Web and HTTP, Web Caching, Web Server, Web Proxy, Bottleneck between an institutional network and the Internet.
Week 10	Introduction and Transport-Layer Services, Relationship Between Transport and Network Layers, TCP Segment Structure, UDP Segment Structure, Principles of Reliable Data Transfer, Reliable Data Transfer over a Perfectly Reliable Channel: rdt1.0, Sequence Numbers and Acknowledgment Numbers, TCP handshake
Week 11	Relationship Between Transport and Network Layers, Connectionless Transport: UDP, Segment Structure, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol . Principles of Congestion Control
Week 12	Network Service Models, Virtual Circuit and Datagram Networks, Datagram Networks, What's Inside a Router , The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IP Datagram Fragmentation, IPv4 and IP6Addressing, Network Address Translation (NAT) .
Week 13	The Link Layer:Links, Access Networks, and LANs, The Services Provided by the Link Layer, Where Is the Link Layer Implemented?, Ethernet, Ethernet Frame Structure, Ethernet Technologies, Link-Layer Switches, Forwarding and Filtering, Switches Versus Routers, Virtual Local Area Networks (VLANs),
Week 14	Wireless and Mobile Networks Introduction, The 802.11 Architecture, Wireless Links and Network Characteristics, Code division multiple access (CDMA), The IEEE 802.11 Frame ,The 802.11 MAC Protocol
Week 15	Wireless LANs, Dealing with Hidden Terminals: RTS and CTS, Cellular Network Architecture, 2G: Voice Connections to the Telephone Network, Radio Access Network, Mobility Management: Principles, Routing Calls to a Mobile User, Handoffs in GSM, Wireless and Mobility.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Computer Networking: A Top-Down Approach., this reference has been adopted for use at many hundreds of colleges and universities, translated into 14 languages, and used by over one hundred thousand students and practitioners worldwide. And it has been adopted as a source.	Yes

Recommended Texts	none	
Websites	Computer Networking: A Top-down Approach - James F. Kurose, Keith W. Ross - Google Books	

Grading Scheme مخطط الدرجات				
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Control Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COEN 3203**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGIII	**Semester of Delivery**		Six
Administering Department		Network Engineering	**College**	Engineering	
Module Leader	Ahmed Sabah Noori		**e-mail**	asabah22@gmail.com	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Signal and Systems	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introducing the basic principles, techniques and applications of modern control engineering. 2. Study methods for designing and analyzing modern control systems 3. To derive mathematical models of mechanical systems and electrical systems. 4. To predict the effects on the location of the closed-loop poles of varying the gain value in control systems. 5. To Design solutions based on modern control systems for realistic and engineering problems. 6. Use MATLAB to obtain responses of control systems to various inputs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduction to control systems, includes examples and applications of control systems 2. State the design of open and closed control systems. Also, the advantages and disadvantages of using each system. 3. Mathematical modeling of control systems that are described by linear differential equations. Specifically, transfer function expressions of differential equation systems are derived. 4. Derives mathematical models of various mechanical and electrical systems that appear frequently in control systems. 5. Reduce a block diagram of multiple subsystems to a single block representing the transfer function from input to output. 6. How to obtain state-space expressions of differential equation systems are derived. Using MATLAB to transform mathematical models from transfer functions to state-space equations and vice versa. 7. Describe quantitatively the transient response of first-order systems 8. Write the general response of second-order systems given the pole location 9. Find the damping ratio and natural frequency of a second-order system 10. Find the settling time, peak time, percent overshoot, and rise time for an underdamped second-order system 11. Find the steady-state error for a unity feedback system. Also, specify a system's steady-state error performance. 12. State the properties of a root locus. As well as, find the coordinates of points on the root locus and their associated gains.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to control systems- terms definitions, objectives, applications, classifications, design, process, advantages & disadvantages of open and closed control systems. [6 hrs] Mathematical models – linear differential equations, transfer function, state-space, mechanical & electrical systems, block diagram reduction, Matlab coding for math. models. [25 hrs]

	Time response analyses – 1st order system, 2nd order systems, transient response, damping ratio and natural frequency of a second-order system, steady-state error, routh's stability criterion. [17 hrs] Control system analysis and design by Root-locus plots, plotting root loci manually and by MATLAB. [12]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #2, #3 and #4, #5
	Assignments/ Projects	2	5% (5)	2 and 12	LO #6, #7 and #8-#9
Summative assessment	**Midterm Exam**	2hr	30% (30)	8	LO #1 - #6
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and examples of control systems
Week 2	Closed-Loop Versus Open-Loop Control systems
Week 3	Mathematical Modeling & Transfer Function
Week 4	Mathematical Modeling of Electrical Systems
Week 5	Mathematical Modeling of Mechanical Systems
Week 6	Block Diagram Reduction
Week 7	Modeling in State Space
Week 8	Mid-exam & Modeling in State Space
Week 9	The Time Response Of First-Order Systems
Week 10	The Time Response Of Second-Order Systems
Week 11	Transient and Steady-State Response Analyses
Week 12	Steady-State Errors
Week 13	Routh's Stability Criterion
Week 14	Root-Locus Plots
Week 15	Examples of Root-Locus Plots
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	Introduction, plot signals
Week 3,4	Transfer Function, Roots
Week 5,6	State Space
Week 7,8	Block Diagram Reduction
Week 9,10	Time Response Of First-Order Systems
Week 11,12	Time Response Of Second-Order Systems
Week 13,14	Root-Locus Plots

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Modern Control Engineering" by Ogata K., 5th Edition. Control system engineering, N. S. Nise 6th edition.	Yes
Recommended Texts	Linear Control System Analysis and Design By Dazzo 2nd edt.	No
Websites	https://www.mathworks.com/solutions/control-systems.html	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Signal processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DISP 3202				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	Network Engineering		**College**	College of engineering	
Module Leader	Ahmed Sabah Noori		**e-mail**	asabah22@gmail.com	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Signals and Systems	**Semester**	Five
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of the Digital Signal encountered in engineering. Focus will be on the methods for characterizing and analyzing Discrete-time signals and systems. Students will learn some transform techniques (Fourier transform, z-transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, and Digital image processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of signal sampling. 2. Express the concepts of Discrete signals and systems and their different types which can be used in a wide variety of disciplines in engineering. 3. Identify and report system properties such as causality, stability, linearity, and time invariance etc. 4. Apply the convolution sum formulas to determine the output of discrete time systems. 5. Understand and resolve the Discrete time signals in frequency domain using Fourier series and Fourier transforms, and Fast Fourier Transform. 6. Understand the concept of z-transform and its and develop the ability to analyze the system in z- domain. 7. Understand the concept of digital filter design and develop the ability to design filters using different methods.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Sampling of continuous-time signals. • Basic signals of Discrete time. • Discrete time Signals and Their Classification - Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals. • Operations on Discrete time Signals • Properties of Discrete time systems. • Discrete time System Impulse response Evaluation. • Signal convolution methods (Graphical method, Table method, mathematical method). • Representation of Discrete Fourier transform and its properties. • Discrete Fourier series (DFS) • Fast Fourier Transform (FFT) • Introduction to Z-transform and its properties. • Digital FIR Filter Analysis and design • Digital IIR Filter Analysis and design - Butterworth Analog Filters • Digital IIR Filter Analysis and design - Cheby-Chev Analog Filters

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	5% (5)	5 and 10	LO #1, #2 and #5, #6
	Assignments	2	5% (5)	2 and 12	LO #2, #3 and #6, #7
Summative assessment	**Midterm Exam**	2hr	30% (30)	7	LO #1 - #4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts of Discrete Signals and Systems - Introduction
Week 2	Sampling of continuous-time signals: the sampling theorem, Aliasing, Nyquist rate.
Week 3	Discrete time signal types and operations on Discrete time signals.
Week 4	Discrete time system types and properties.
Week 5	Discrete time System Impulse response Evaluation
Week 6	Discrete time System convolution (Graphical method, Table method, mathematical method)

Week 7	**Mid-term Exam,** Discrete time System convolution
Week 8	Introduction to Discrete Fourier transform and its properties
Week 9	Discrete Fourier series (DFS)
Week 10	Fast Fourier Transform (FFT)
Week 11	Introduction to Z-transform and its properties.
Week 12	Digital FIR Filter Analysis and design
Week 13	Digital IIR Filter Analysis and design - Butterworth Analog Filters
Week 14	Digital IIR Filter Analysis and design - Chebychev Analog Filters
Week 15	Examples on Digital & Analog Filters
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall John G. Proakis, Dimitris K Manolakis., 1992.	Yes
Recommended Texts	Discrete-Time Signal Processing by A. V. Oppenheim and R. W. Schafer, 1999.	yes
Websites	https://www.coursera.org/learn/ Digital signal processing	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Ministry Of Higher Education & Scientific Research
Al-Iraqia University
College of Engineering
Networks Engineering Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Internet of things**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**INTH 3205**				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGIII (3)	**Semester of Delivery**		Six (2)
Administering Department		NE	**College**	Type College Code	
Module Leader	Aya Ayad Hussein		**e-mail**	Aya.ayad.it@gmail.com	
Module Leader's Acad. Title		Assistant lecturer	**Module Leader's Qualification**		M.sc
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The Internet is evolving to connect people to physical things and physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables the student to understand the basics of the Internet of Things and protocols. It introduces some of the application areas where the Internet of Things can be applied. Students will learn about middleware for the Internet of Things. To understand the concepts of the Web of Things In addition, The Internet of Things (IoT) is the network of physical objects in which microprocessors and wireless radios are embedded to intelligently serve people in a collaborative manner. In the future, IoT is expected to revolutionize many areas of human life i.e., agriculture, healthcare, transportation, manufacturing, engineering, etc. This course covers the conceptual understanding of IoT fundamentals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of the course, students will be able to: 1. Understand the various concepts, terminologies, and architecture of IoT systems. 2. Design IoT system hardware and software. 3. Use sensors and actuators for the design of IoT. 4. Understand various protocols for the design of IoT systems. 5. Use various techniques of data storage and analytics in IoT. 6. Understand various applications of IoT. 7. Understand APIs to connect IoT-related technologies. 8. be able to design and deploy multiple IoT devices (Raspberry bi & Arduino) that could connect to the gateway. 9. Apply professional skills to solve industry problems using IoT approaches.

Indicative Contents المحتويات الإرشادية	• What is the IoT and why is it important? • Protocol Standardization for IoT • IoT Open-source architecture (OIC) • Web of Things versus Internet of Things • IoT applications for the industry

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Lecturing offline mode, in class. 2. Assignment, project and quizzes. 3. Hands-on and interactive activities.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #9, #10
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8 and #13
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• **Class Overview** • **Fundamentals of IoT:** ▪ Introduction, Definitions & Characteristics of IoT ▪ IoT Architectures ▪ Physical & Logical Design of IoT
Week 2	• **Fundamentals of IoT (continued):** ▪ Enabling Technologies in IoT ▪ History of IoT ▪ About Things in IoT ▪ The Identifiers in IoT ▪ About the Internet in IoT ▪ IoT frameworks ▪ IoT and M2M.
Week 3	• **IoT simulation Enviroment :** ▪ Definition, Types of Sensors and Actuators, Examples, and Working ▪ IoT Development Boards: ▪ Arduino IDE and Board Types ▪ Raspberry Pi Development Kit ▪ RFID Principles and components • **Intro to Course Project**
Week 4	• **IoT Node configuration and data processing:** • Wireless Sensor Networks: ▪ History and Context ▪ The node, Connecting nodes, Networking Nodes. ▪ WSN and IoT.

Week 5	**Project Proposal Presentations**
Week 6	• **IoT Networking and Communications Basics** ▪ Protocol Standardization for IoT ▪ Efforts ▪ M2M and WSN Protocols ▪ SCADA and RFID Protocols
Week 7	• **IoT Networking and Communications Basics (continued) :** • Protocols: ▪ IEEE802.15.4 ▪ BACnet ▪ Modbus ▪ KNX ▪ Zigbee ▪ Network layer ▪ APS layer
Week 8	**IoT System Energy Consumption**
Week 9	• **IOT ARCHITECTURE** ▪ IoT Open-source architecture (OIC) ▪ OIC Architecture & Design principles ▪ IoT Devices and deployment models
Week 10	• **IOT ARCHITECTURE (continued)** • IoTivity: An Open source IoT stack ▪ Overview ▪ IoTivity stack architecture ▪ Resource model and Abstraction.
Week 11	**Monthly exam**

Week 12	**Security in IoT**
Week 13	**IOT APPLICATIONS** • IoT applications for the industry • Future Factory Concepts • Brownfield IoT
Week 14	**IOT APPLICATIONS (continued)** • Smart Objects • Smart Applications • Study of existing IoT platforms /middleware • IoT- A, Hydra etc.
Week 15	**Presentations and Final Project Demonstrations**
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: introduction to raspberry pi and Arduino lab introduction to Programming Language: Python
Week 2	Lab 2: Getting started with Raspberry Pi, Install Raspbian on your SD card
Week 3	Lab 3: Linux basic commands.
Week 4	Lab 4: Coding simple programs in Python.
Week 5	Lab 5: How to use Python-based IDE (integrated development environments) for the Raspberry Pi and how to trace and debug Python code on the device
Week 6	Lab 6: How to have your Raspberry Pi interact with online services using public APIs and SDKs.
Week 7	Lab 7: Arduino basic setup, how to install it and use it, shields to extend the functionality of an Arduino-based system.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013	Yes

	• Olivier Hersent, David Boswarthick, and Omar Elloumi, — "The Internet of Things: Key Applications and Protocols", WileyPublications • "RASPBERRY PI ASSEMBLER", Roger Ferrer Ibanez, Cambridge, Cambridgeshire, U.K.,William J. Pervin, Dallas, Texas, U.S.A.	
Recommended Texts	• Vijay Madisetti and ArshdeepBahga, — "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.	No
Websites	https://www.coursera.org/specializations/iot	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**ANTENNA AND PROPAGATION**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ANPR 3204**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Network	**College**	Engineering	
Module Leader	MOHAMMED KHALID		**e-mail**	ALOBAIDI.M.K.I@GMAIL.COM	
Module Leader's Acad. Title		lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MAT201	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding Antennas: The module aims to provide students with a solid foundation in the principles and theory of antennas. This includes understanding the different types of antennas, their characteristics, and their applications in various communication systems. 2. Radiation Fundamentals: Students are expected to gain knowledge about the fundamental concepts of electromagnetic radiation, including the generation, propagation, and reception of electromagnetic waves. This includes understanding concepts such as polarization, radiation patterns, and antenna gain. 3. Antenna Parameters and Performance: The module aims to familiarize students with the different parameters that describe the performance of antennas. This includes concepts such as impedance, bandwidth, efficiency, and directivity. Students should be able to analyze and evaluate the performance of antennas based on these parameters. 4. Antenna Design and Analysis: The module aims to develop the skills necessary for designing and analyzing antennas. Students will learn about various design techniques, simulation tools, and optimization methods used in antenna design. They will also gain practical experience in designing antennas for specific applications. 5. Propagation of Electromagnetic Waves: The module aims to provide an understanding of how electromagnetic waves propagate through different media, such as free space, atmosphere, and various materials. This includes studying the concepts of path loss, multipath propagation, fading, and other propagation phenomena. 6. Applications and Emerging Technologies: The module aims to explore the practical applications of antennas and propagation in various fields, such as wireless communications, satellite systems, radar systems, and wireless sensor networks. It may also cover emerging technologies and trends in antenna design and propagation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge of Antenna Types and Characteristics: Students will gain a comprehensive understanding of various antenna types, such as wire antennas, aperture antennas, and array antennas. They will learn about the characteristics and properties of different antennas, including radiation patterns, impedance, bandwidth, and polarization. 2. Understanding of Electromagnetic Wave Propagation: Students will develop a solid understanding of how electromagnetic waves propagate through different media, including free space, atmosphere, and various materials. They will learn about concepts such as path loss, diffraction, reflection, refraction, scattering, and multipath propagation. 3. Ability to Design and Analyze Antennas: Students will acquire the skills to design and analyze antennas for specific applications. They will learn design

techniques, simulation tools, and optimization methods used in antenna design. They will be able to evaluate antenna performance based on parameters such as impedance matching, radiation efficiency, and directivity.

4. Familiarity with Antenna Measurement Techniques: Students will learn about the different measurement techniques used for characterizing antennas. They will gain hands-on experience with antenna measurement equipment and learn how to interpret measurement results. They will also understand calibration procedures and sources of measurement errors.
5. Application of Antenna and Propagation Principles: Students will be able to apply their knowledge of antennas and propagation to practical applications. They will understand how antennas are used in various communication systems, including wireless networks, satellite systems, radar systems, and wireless sensor networks. They will also be aware of emerging technologies and trends in antenna design and propagation.
6. Analytical and Problem-Solving Skills: Through coursework and practical exercises, students will develop analytical and problem-solving skills related to antenna design, analysis, and propagation. They will be able to analyze complex antenna systems, identify potential issues, and propose appropriate solutions.
7. Communication and Presentation Skills: Students will enhance their communication and presentation skills through assignments, projects, and presentations related to antennas and propagation. They will learn how to effectively communicate their ideas, designs, and findings to both technical and non-technical audiences.
8. Analysis of Antenna Performance in Different Environments: Students will learn to analyze the performance of antennas in various environmental conditions. They will understand the impact of different factors such as terrain, buildings, and atmospheric conditions on signal propagation and antenna performance. They will gain the ability to assess and optimize antenna performance for specific deployment scenarios.
9. Knowledge of Advanced Antenna Technologies: Students will be exposed to advanced antenna technologies and concepts. This may include topics such as smart antennas, phased arrays, beamforming, and adaptive antenna systems. They will understand the principles and applications of these technologies, and how they can enhance the performance and efficiency of communication systems.
10. Antenna Integration and System Considerations: Students will gain an understanding of the integration of antennas into communication systems. They will learn about the considerations and challenges involved in antenna placement, impedance matching, interference mitigation, and system-level optimization. They will be able to design antenna systems that meet the requirements of specific applications.
11. Antenna Modeling and Simulation: Students will acquire skills in modeling and simulating antennas using software tools and numerical techniques. They will learn how to use simulation software to analyze antenna performance, optimize designs, and predict radiation patterns. They will be

	able to validate their designs through simulations and understand the limitations of modeling approaches.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Antenna theory</u> Introduction to Antenna and Propagation-Course overview and objectives-Introduction to electromagnetic waves and their properties-Basic concepts of antenna radiation and propagation- Antenna parameters and characteristics Radiation patterns and antenna gain-Polarization and impedance matching- Wire Antennas. [15 hrs] Aperture Antennas Patch antennas (rectangular, circular)-Horn antennas and their characteristics-microstrip antenna. [15 hrs] Parabolic reflector antennas- Antenna Arrays-Array configurations and properties Array factors and pattern synthesis-Beamforming techniques and applications . [10 hrs] Modeling techniques and software tools-Numerical methods for antenna analysis-Simulation of radiation patterns and antenna performance. [15 hrs] Revision problem classes [6 hrs] <u>Part B – Electromagnetic propagation</u> Propagation Fundamentals Propagation mechanisms and models-Free space propagation and path loss-Friis transmission equation and link budget analysis. [15 hrs] path loss-Friis transmission equation and link budget analysis[7 hrs] Multipath Propagation Reflection, refraction, and diffraction-Multipath fading and channel models-Diversity techniques for mitigating fading effect. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Lectures are a fundamental component of the course where the instructor delivers content and explanations of key concepts, theories, and principles related to antennas and propagation. This strategy helps provide a comprehensive understanding of the subject matter and introduces students to new topics. 2. Hands-on Laboratory Sessions: Laboratory sessions allow students to apply theoretical knowledge to practical scenarios. They may involve antenna measurements, design exercises, and simulation software usage. These sessions provide students with hands-on experience in working with antennas, measuring their characteristics, and analyzing their performance. 3. Assignments and Projects: Assignments and projects allow students to delve deeper into specific topics and develop problem-solving skills. They may involve designing antennas for specific applications, analyzing antenna performance in different scenarios, or conducting research on emerging antenna technologies. These assignments and projects encourage critical thinking, independent learning, and application of concepts. 4. Group Discussions and Presentations: Group discussions and presentations provide opportunities for students to engage in peer-to-peer learning. Students can discuss and analyze case studies, solve problems collaboratively, and present their findings to the class. This strategy encourages active participation, communication skills, and the exchange of ideas among students. 5. Computer Simulations and Modeling: Computer simulations and modeling software can be used to enhance learning and understanding of antenna behavior. Students can simulate antenna designs, analyze their performance, and visualize radiation patterns. This strategy allows students to gain practical experience in antenna design and analysis using virtual tools. 6. Guest Lectures and Industry Collaboration: Inviting guest speakers from industry or academia can provide students with insights into real-world applications, current trends, and challenges in the field of antennas and propagation. Industry collaborations, such as guest projects or site visits, can further enhance the practical relevance of the course and expose students to professional practices. 7. Online Resources and Discussion Forums: Supplemental online resources, such as readings, videos, and interactive tutorials, can be provided to support student learning. Online discussion forums or platforms can facilitate asynchronous discussions among students, allowing them to share insights, ask questions, and collaborate outside of class time. 8. Formative and Summative Assessments: Regular formative assessments, such as quizzes, homework assignments, and in-class exercises, help monitor student progress and reinforce understanding. Summative assessments, such

	as exams or comprehensive projects, evaluate student learning and achievement of the learning outcomes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Antenna and Propagation: Course overview, objectives, and expectations Basic concepts of electromagnetic waves

	Introduction to antennas and their applications, types of antenna
Week 2	Radiation patterns of thin wire antenna Principles of antenna pattern and lobes, radiation intensity, directivity, gain (two dimension and three dimensions)
Week 3 **Week 4**	OMNI directional pattern Directional pattern antenna Antenna efficiency, bandwidth, polarization, input impedance, antenna and radiation efficiency, antenna equivalent area, Fraunhofer region and Fresnel region, antenna temperature.
Week 5 **Week 6**	Friis transmission equation Radar range equation Antenna Arrays Array configurations and radiation properties Array factors and pattern synthesis Beamforming techniques
Week 7 **Week 8**	Reflector antenna-microstrip antenna
Week 9 **Week 10**	Electromagnetic wave propagation fundamentals, wave propagation in lossless medium, conductors and dielectric properties, wave propagation in conductor medium, wave propagation in good dielectric medium, wave propagation in good conductor medium.
Week 11 **Week 12**	Depth of penetration, surface impedance, reflections and refractions of wave, wave length and phase velocity,
Week 13 **Week 14**	Modes of wave propagations, sky wave and tropospheric modes, spectrum of EM wave and applications, ionospheric prorogation, propagation in variable index medium
Week 15	Fading wave, propagation over plane earth, Freznel zone.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Lab 1: Introduction to platform simulator
Week 3-4	Lab 2: antenna performance indicators (impedance and s-parameters)
Week 5-6	Lab 3: antenna performance indicators (electromagnetic field and current distribution)
Week 7-8	Lab 4: Design and simulation of wire antenna
Week 9-10	Lab 5: Design and simulation aperture antenna
Week 11-12	Lab 6: Design and simulation of microstrip antenna
Week 13-14	Lab 7: Design and simulation of antenna array
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Antenna Theory: Analysis and Design, Constantine A. Balanis	Yes
Recommended Texts	Antennas and Wave Propagation, By G. S. N. Raju · 2006	No
Websites	https://www.antenna-theory.com/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Ministry Of Higher Education & Scientific Research
Al-Iraqia University
College of Engineering
Networks Engineering Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Cloud Computing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CLCO 4205**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGIV (4)	**Semester of Delivery**		EIGHT (2)
Administering Department		NE	**College**	Type College Code	
Module Leader	Aya Ayad Hussein		**e-mail**	aya.ayad.it@gmail.com	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		M.sc
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Omar Raad Kadhim	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This module aims to introduce the learner to the concept of cloud computing and how it differs from the client-server computation model seen on the web today. Cloud computing applications are charged on a per-use basis i.e. clients only pay for what they have used. Many companies are using cloud computing to offload some of their work onto these clouds to save on software and hardware cost. Due to this new model of computation, we require new methods of developing and creating software. At the end of this module, the learner will be able to understand the different models of cloud applications (IaaS, PaaS, SaaS) and determine which is the right one for the task they need and will also understand the role virtualization plays in the cloud and how it will impact their applications. Learners will also be able to develop basic web applications and deploy them to the cloud.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will be able to: 1. understand the basics of cloud computing and data visualization. 2. understand the theoretical background for computing and storage cloud environments. 3. understand the criteria for selecting cloud computing platform. 4. understand the methodologies and technologies for developing applications in cloud computing environments. 5. build and deploy simulations for cloud computing services in various applications. 6. perform IaaS software and PaaS software for developing cloud applications. 7. understand the security issues and disaster recovery in cloud-based applications. 8. perform monitoring, managing, and cost optimization procedures in cloud-based applications. 9. discuss the Cloud computing career opportunities and future research directions.
Indicative Contents المحتويات الإرشادية	• Cloud computing: • cloud platforms • Virtualization • Cloud Application Programming Models (Task, Thread, and MapReduce) • Cloud applications, and future directions in utility and cloud computing • "Big data" processing and analytics in distributed environments.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The module is taught using a combination of lectures, demonstrations, and tutorials. The demonstrations and tutorials focus on getting learners up to standard in practical application development. The lectures supply the necessary theoretical background through Lecturing offline mode in class, Assignments, projects, and quizzes, Hands-on and interactive activities. In a fast-changing technology field learners are expected under guidance to engage in research in relation to the different technologies and products available.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #4, #6
	Assignments	2	10% (10)	2 and 12	LO #3, #5 and #7, #8, #9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8 and #9
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to cloud computing** • What is cloud computing? • Types of cloud computing • Benefits of cloud computing • Challenges of cloud computing • Pros and Cons of Cloud Computing, • Benefits of Cloud Computing
Week 2	**visualization** • Overview of data visualization. • The importance of data visualization. • The relationships, comparisons, distribution, and composition of data.
Week 3	**Cloud computing platforms** • Amazon Web Services (AWS) • Microsoft Azure • Google Cloud Platform (GCP)
Week 4	**Cloud computing services models** • Infrastructure as a Service (IaaS) • Platform as a Service (PaaS) • Software as a Service (SaaS)
Week 5	**Cloud computing networking** • Virtual private networks (VPNs) • Load balancing • Content delivery networks (CDNs)
Week 6	**Cloud computing security** • Data security • Application Security • Infrastructure security • Network-level security • Host-level security
Week 7	**Cloud computing storage** • Object storage • Block storage • File storage

Week 8	**Cloud computing disaster recovery** • Backup and restore. • High availability. • Disaster recovery plans
Week 9	**Cloud computing monitoring** • Performance monitoring • Security monitoring • Cost monitoring
Week 10	**Cloud computing costs** • Pricing models • Cost savings • Cost optimization
Week 11	**Mid - exam**
Week 12	**Cloud computing best practices.** • Design for scalability. • Use managed services. • Automated tasks.
Week 13	**Cloud computing career opportunities** • Cloud architect • Cloud engineer • Cloud administrator
Week 14	**Cloud computing research** • Current trends • Emerging technologies
Week 15	**Presentations**
Week 16	**The preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Configure various virtualization tools such as Virtual Box, VMware workstation
Week 2	Lab 2: Design a web application in a PaaS environment
Week 3	Lab 3: deploy a web application in a PaaS environment
Week 4	Lab 4: Learn how to simulate a cloud environment to implement new schedulers
Week 5	Lab 5: Install a generic cloud environment that can be used as a private cloud
Week 6	Lab 6: use a generic cloud environment that can be used as a private cloud
Week 7	Lab 7: Manipulate large data sets in a parallel environment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Cloud Computing Concepts, Technology & Architecture Thomas Erl, Zaigham Mahmood, and Ricardo Puttini 2. Cloud Security and Privacy Tim Mather, Subra Kumaraswamy, and Shahed Latif	Yes
Recommended Texts	Cloud Computing: Concepts and Technologies, Sunilkumar Manvi, Gopal Shyam	No
Websites	Introduction to Cloud Computing | Coursera	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry Of Higher Education & Scientific Research Al-Iraqia University College of Engineering Networks Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	WIRELESS SENSOR NETWORKS	**Module Delivery**	
Module Type	**CORE**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	WISN 4202		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UGIV	**Semester of Delivery**	Eight
Administering Department	Network Engineering	**College**	Engineering
Module Leader	Samar Kareem Ibrahim	**e-mail**	Samar.kareem90@gmail.com
Module Leader's Acad. Title	ASST. LECTURER	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Network Protocol	**Semester**	Seven
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1) Principle of Wireless Sensor Networks: a) Introduce the fundamental principles, concepts, and characteristics of Wireless Sensor Networks (WSNs). b) Provide an understanding of the applications, advantages, and challenges associated with WSNs. 2) Hardware Design for WSNs: a) Familiarize students with the hardware components and design considerations specific to WSNs. b) Provide an understanding of sensor selection, integration, and interfacing techniques for developing sensor nodes. c) Discuss power management, energy harvesting, and battery considerations in WSN hardware design. 3) Embedded Software Design for WSNs: a) Introduce students to the design principles and considerations for developing embedded software in WSNs. b) Explore programming languages, platforms, and tools used in embedded software development. 4) Routing Technologies in WSNs: a) Provide an overview of routing protocols and algorithms used in WSNs. b) Explore the advantages, limitations, and trade-offs of different routing protocols for specific WSN applications. c) Discuss network scalability, energy efficiency, and data aggregation techniques in routing for WSNs. 5) Optimization of Sink Node Positioning: a) Introduce techniques for optimizing the placement and positioning of sink nodes in WSNs. b) Discuss algorithms and optimization strategies for improving network coverage, data collection efficiency, and energy consumption. 6) Sensor Data Fusion and Event Detection: a) Introduce students to sensor data fusion techniques for combining and processing data from multiple sensors in WSNs. b) Discuss event detection algorithms and approaches for identifying and responding to specific events or anomalies in WSN data. c) Explore techniques for data filtering, noise reduction, and feature extraction in sensor data fusion. 7) WSN Security: a) Address the security challenges and requirements in WSNs. b) Discuss encryption, authentication, and secure communication protocols specific to WSNs.		

	c) Explore intrusion detection, key management, and secure data aggregation techniques for enhancing WSN security. 8) Mobile Target Localization and Tracking: a) Introduce techniques for localizing and tracking mobile targets in WSNs. b) Discuss localization algorithms based on ranging and centralizing. c) Explore tracking algorithms and strategies for monitoring and predicting the movement of mobile targets using WSNs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 Principle of Wireless Sensor Networks: a) Demonstrate an understanding of the fundamental principles, concepts, and characteristics of Wireless Sensor Networks (WSNs). b) Explain the key components, functions, and applications of WSNs. c) Analyze the challenges and limitations associated with WSNs and propose possible solutions. 2 Hardware Design for WSNs: a) Design and select appropriate hardware components for WSNs, considering factors such as sensor types, power requirements, and communication interfaces. b) Implement hardware design techniques for sensor nodes, including power management, sensor integration, and communication modules. 3 Embedded Software Design for WSNs: a) Develop embedded software for WSNs, considering resource constraints and energy efficiency requirements. 4 Routing Technologies in WSNs: a) Understand and evaluate different routing protocols used in WSNs, such as LEACH and AODV. b) Analyze the advantages, limitations, and trade-offs of routing protocols in terms of energy efficiency, scalability, and network performance. 5 Optimization of Sink Node Positioning: a) Analyze and optimize the placement of sink nodes in WSNs to improve data collection efficiency, network coverage, and energy consumption. 6 Sensor Data Fusion and Event Detection: a) Understand the concepts and algorithms of sensor data fusion and event detection in WSNs. b) Implement data fusion techniques to combine and process data from multiple sensors, improving data accuracy and reducing redundancy. c) Develop event detection algorithms based on sensor data to identify and respond to specific events or anomalies. 7 WSN Security: a) Identify security threats and vulnerabilities in WSNs and understand the principles of secure communication and data protection. b) Implement security mechanisms such as encryption, authentication, and intrusion detection systems to ensure the confidentiality, integrity, and availability of WSN data and communication. 8 Mobile Target Localization and Tracking: a) Understand the challenges and techniques for mobile target localization and tracking in WSNs. b) Implement algorithms for target localization, tracking, and movement prediction using sensor data and localization techniques such as RSSI,

	TDOA, or TOA. c) Evaluate and optimize the performance of target localization and tracking algorithms in different WSN scenarios.

Indicative Contents المحتويات الإرشادية	1. Introduction Wireless Sensor Networks 2. PRINCIPLE OF WIRELESS SENSOR NETWORKS 3. HARDWARE DESIGN FOR WSNS 4. ROUTING TECHNOLOGIES IN WSNS 5. OPTIMIZATION OF SINK NODE POSITIONING 6. SENSOR DATA FUSION AND EVENT DETECTION 7. WSN SECURITY 8. MOBILE TARGET LOCALIZATION AND TRACKING
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1) Lectures: Traditional lectures can be used to deliver theoretical concepts, principles, and foundational knowledge related to Wireless Sensor Networks. Lectures can provide an overview of the subject matter, introduce key concepts, and explain complex topics in a structured manner. 2) Practical Sessions: Hands-on practical sessions play a crucial role in the understanding and application of Wireless Sensor Networks. These sessions can involve programming exercises, hardware design and implementation. Practical sessions allow students to gain practical skills and reinforce theoretical knowledge. 3) Problem-solving and Discussions: Engaging students in problem-solving activities and discussions can promote critical thinking and deeper understanding of WSN concepts. Presenting challenging scenarios or open-ended problems related to WSN design, optimization, or security can encourage students to analyze, brainstorm, and propose solutions. 4) Assessments and Feedback: Regular assessments, such as quizzes, assignments, and exams, can be used to evaluate students' understanding of the course material. Providing timely feedback on assessments can guide students' learning progress and help them identify areas of improvement.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1 - 5
	Assignments	2	10% (10)	2, 12	LO # 1 - 7
	Laboratory	1	10% (10)	Continuous	
Summative assessment	Midterm Exam	1 hr	20% (20)	9	LO # 1- 6
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**1 INTRODUCTION** 1.1 Wireless Sensor Networks 1.2 Application Areas of WSNs 1.3 Challenges in the Design and Implementation of WSNs
Week 2	**2 PRINCIPLE OF WIRELESS SENSOR NETWORKS** 2.1 ZigBee and Wireless Sensor Networks
Week 3	**3 HARDWARE DESIGN FOR WSNS** 3.1 General Wireless Sensor Node Architecture 3.2 System-on-Chip and Component-based Design 3.3 Design Guidelines
Week 4	3.4 Design Case 3.5 Power Management 3.6 Energy Scavenging
Week 5	**4 EMBEDDED SOFTWARE DESIGN FOR WSNS** 4.1 Embedded Software Design for WSNs
Week 6	**5 ROUTING TECHNOLOGIES IN WSNS** 5.1 Classification of Routing Protocols in WSNs 5.2 AODV Routing Protocols
Week 7	5.3 Cluster-Tree Routing Protocol 5.4 Energy-Aware Routing Protocols

Week 8	**6 OPTIMIZATION OF SINK NODE POSITIONING** 6.1 Challenges of Sink Node Positioning 6.2 Categories of Sink Node Positioning Approaches
Week 9	6.3 Optimizing Locations of Static Multiple Sink Nodes 6.4 Solving Optimal Location Problems
Week 10	**8 SENSOR DATA FUSION AND EVENT DETECTION** 8.1 Introduction: Features of Sensor Data 8.2 Sensor Data Fusion Techniques 8.3 Event Detection
Week 11	8.4 Generic Sensor State Model 8.5 Sensor State Model Based Event Detection 8.6 Sensor Network as a Database
Week 12	**9 WSN SECURITY** 9.1 Unique Challenges in WSN Security 9.2 Classifications of Security Attacks on WSNs
Week 13	9.3 ZigBee Security Services
Week 14	**10 MOBILE TARGET LOCALIZATION AND TRACKING** 10.1 Distance Determination
Week 15	10.2 Localization Methods 10.3 Case Study—Underground Tunnel Mobile Target Tracking
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Beginning Sensor Networks with Arduino
Week 2	Lab 2: Building Personal Mini-Weather Station
Week 3	Lab 3: Building a small outdoor lighting system
Week 4	Lab 4: Distance Measurement and Personal Area Network
Week 5	Lab 5: Wireless Home Automation System
Week 6	Lab 6: Exploring Motion: Harnessing the Power of Gyroscopes

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Shuang-Hua Yang, "Wireless Sensor Networks, Principles, Design and Applications", Springer-Verlag London 2014	
Recommended Texts	Anna Forster, "Introduction to Wireless Sensor Networks", Wiley-IEEE Press 2016	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**NETWORK SECURITY**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NESE 4203				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIV		**Semester of Delivery**	Eight	
Administering Department	Network		**College**	Engineering	
Module Leader	.satea hikmat alnajjar		**e-mail**	E-mail	
Module Leader's Acad. Title	Assist. Prof. Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Network Protocol	**Semester**	Seven
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course learning some of the more prevalent and damaging classes of Internet attacks, including malware attacks, denial of service, sniffing, source masquerading, and message modification and deletion. In the second part of this cores, we'll examine how the fundamental cryptography principles can be used to create secure networking protocols. We'll examine how to secure email how to secure a TCP connection, how to provide blanket security at the network layer, and how to secure a wireless LAN. Furthermore, consider operational security, which is about protecting organizational networks from attacks. In particular, we'll take a careful look at how firewalls and intrusion detection systems can enhance the security of an organizational network.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Upon successful completion, students will have the knowledge and skills to:** 1. Understand and describe the Availability Network Security Mode. 2. Students will demonstrate an understanding of the usability, reliability, integrity, and safety of networks and data. 3. Students learn basic principles of How Can Network Security Be Achieved and Cryptographic Techniques. 4. Students be able to examine how to secure email, how to secure a TCP connection, how to provide blanket security at the network layer, and how to secure a wireless LAN. 5. Protecting organizational networks from attacks and how firewalls and intrusion detection systems work, these can enhance the basic concepts for the student in organizational networks security. 6. Concepts and topics included in the course; the student will be able to

	develop his skills in the future in the field of network security.
Indicative Contents المحتويات الإرشادية	• Network Security is a broad and complex field that encompasses various aspects of securing computer networks and the data transmitted within them. In the fourth stage of studying network security, you will typically delve deeper into advanced topics and gain a more comprehensive understanding of the subject. Here are some indicative contents you may encounter during the fourth stage: • Cryptography: - Advanced encryption algorithms (e.g., AES, RSA, Elliptic Curve Cryptography) - Public key infrastructure (PKI) - Digital signatures and certificates - Key management and distribution - Cryptographic protocols (e.g., SSL/TLS, IPsec) Secure Network Design: - Defense-in-depth strategies - Network segmentation and zoning - Virtual private networks (VPNs) - Intrusion detection and prevention systems (IDS/IPS) - Security event and information management (SEIM) systems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Assignment, project, and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	0	0 %	0	0
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction Network Security, Access And Availability Network Security Mode.
Week 2	Malware, Short for malicious software, Types of Malware, Types of viruses, Trojan Horses, Spyware, Spam, Adware, Anti-Malware Program.
Week 3	How Can Network Security Be Achieved? Types Of Spoofing Attacks, Confidentiality, End-Point Authentication, Operational Security.
Week 4	The Language Of Cryptography, Cryptographic Techniques Cryptographic ,Symmetric Key Cryptography Cipher-Block Chaining.
Week 5	Public Key Encryption, Public Key Encryption Algorithms
Week 6	The RSA algorithm (Rivest-Shamir-Adleman) , Session Keys, Why Does RSA Work?
Week 7	Midterm + Message Integrity And Digital Signatures, Cryptographic Hash Functions, Message Authentication Code, Digital Signatures, Public Key Certification.
Week 8	Authentication Mechanisms, Authentication Protocol *Ap1.0, Ap2.0, Ap3.0, Ap3.1, Ap4.0,* Ap5.0, Secure Shell(SSH).
Week 9	Securing E-Mail, Hash Functions And Digital Signatures.
Week 10	Securing TCP Connections: Secure Sockets Layer (SSL), Handshake, Key Derivation, Data Transfer, SSL Handshake, SSL/TLS (Secure Socket Layer / Transport Layer Security)
Week 11	Network-Layer Security: IPsec Andvirtual Private Networks, IPsec And Virtual Private Networks (VPNS)

Week 12	Authentication, Kerberos Protocol,Header (AH) Protocol And The Encapsulation Security Payload (ESP) Protocol. The Ipsec Datagram, IPsec Services.
Week 13	Securing Wireless LANS, IEEE 802.11i, Operational Security: Firewalls Andintrusion Detection Systems, Traditional Packet Filters.
Week 14	IP Spoofing IP Spoofing, IP Spoofing Using Source IP Spoofing Using Source Routing, TCP blind spoofing TCP blind spoofing.
Week 15	* Discuss students' practical projects in the field of network security and packet analysis through a program Wireshark. [Homework Problems and Questions]
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*1- Computer networking: a top-down approach / / James F. Kurose, Keith W. Ross. —6th.*	Yes
Recommended Texts	*Network Security ISOC NTW © 2000, Cisco Systems, Inc.*	No
Websites	Computer Networking A Top Down Approach 6th Edition By Kurros and Ross.pdf (google.com)	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Optical Network**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**OPNE 4204**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	Eight	
Administering Department	ENG – EET		**College**	EETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Optical communication	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understanding Optical Communication Systems: Optical networks involve the transmission of data using light signals over optical fibers. 2. Designing and Optimizing Optical Networks: by develop the knowledge and skills necessary to design and optimize efficient and reliable optical network architectures. 3. Evaluating Performance and Quality of Service. 4. Optical networks are critical infrastructure and can be vulnerable to various security threats. 5. Optical networks play a crucial role in various applications, including telecommunications, data centers, cloud computing, and high-performance computing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students gain a comprehensive understanding of optical fiber technology, including the physical properties of optical fibers, the principles of light propagation, and the behavior of light signals within fibers. 2. Also, learn about the components and operation of optical transmitters and receivers used in fiber optic communication systems. 3. They learn about wavelength division multiplexing (WDM) techniques that enable multiple data channels to be transmitted simultaneously over a single fiber. 4. Students learn how to design fiber optic links, considering parameters such as link distance, data rate, power budget, and signal quality. 5. They understand how protocols facilitate efficient data transmission, synchronization, and network management in optical networks. 6. Students can develop skills in planning and optimizing optical networks. They learn techniques for network dimensioning, capacity planning, and routing optimization to achieve optimal network performance. 7. They explore emerging technologies, such as coherent optics.
Indicative Contents المحتويات الإرشادية	1. Introduction to Optical Networks • Evolution of communication networks • Advantages of optical networks • Optical network architectures and components 2. Fundamentals of light propagation in optical fibers • Fiber types and Fiber fabrication and manufacturing processes 3. Principles of optical modulation and demodulation • Laser diodes and light-emitting diodes (LEDs) • Photodiodes and receivers 4. Wavelength Division Multiplexing (WDM) Systems • WDM principles and operation • Dense WDM (DWDM) and Coarse WDM (CWDM) systems • Wavelength routing and switching • WDM network design and planning

	5. Optical Amplification • Erbium-doped fiber amplifiers (EDFAs) • Raman amplification • Amplifier noise and gain considerations • Amplifier placement and power management 6. Optical Network Architectures • Passive Optical Networks (PONs), and Fiber to The Home (FTTH) • Optical Transport Networks (OTNs) 7. LiFi technology 8. Optical Network Performance Analysis • Signal impairments and limitations • Bit error rate (BER) and Q-factor calculations 9. Emerging Technologies and Future Trends • Elastic optical networks

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategies will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. ● Theory-Based Lectures: Traditional classroom lectures are used to present theoretical concepts, principles, and theories related to electrical engineering. Professors or instructors explain complex ideas, provide examples, and engage students in discussions to foster understanding. ● Laboratory Experiments: Laboratory sessions are an integral part of electrical engineering education. Students engage in hands-on experiments, using equipment, instruments, and software tools to apply theoretical knowledge, analyze data, and gain practical skills. This helps them understand the practical aspects of electrical engineering and reinforces theoretical concepts.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	86	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, and 3
	Assignments	3	10% (10)	2, 8, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	3	0% (10)	3, 6, 9	LO # 2, 5, and 7
	Report	2	10% (10)	4, 9	LO # 5 and 6
Summative assessment	**Midterm Exam**	2 hours	20% (10)	5,10	LO # 1-7
	Final Exam	3 hours	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	• Introduction to Optical Networks. • Evolution of communication networks. • Advantages of optical networks.
Week 2	• Optical network architectures and components. • Fundamentals of light propagation in optical fibers. • Fiber types and Fiber fabrication and manufacturing processes.
Week 3	• Principles of optical modulation and demodulation. • Laser diodes and light-emitting diodes (LEDs).
Week 4	• Photodiodes and receivers. • Wavelength Division Multiplexing (WDM) Systems.
Week 5	Mid-Exam, WDM principles and operation
Week 6	• WDM network design and planning, • Optical Amplification, Erbium-doped fiber amplifiers (EDFAs).
Week 7	• Raman amplification. • Amplifier noise and gain considerations. • Amplifier placement and power management.
Week 8	• Optical Network Architectures. • Passive Optical Networks (PONs), and Fiber to The Home (FTTH).
Week 9	• Optical Transport Networks (OTNs)

Week 10	• LiFi technology.
Week 11	• Optical Network Performance Analysis. • Signal impairments and limitations.
Week 12	• Bit error rate (BER) and Q-factor calculations.
Week 13	• Emerging Technologies and Future Trends.
Week 14	• Elastic optical networks.
Week 15	• Review and revision
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• Introduce to various layers and parts of an optical fiber cable in Optisystem program.
Week 2	• Identify various layers and optical network components.
Week 3	• Direct Intensity Modulation.
Week 4	• Compensation of Dispersion with Fiber Bragg Grating Component.
Week 5	• Test the performance of pulse width where optical fiber cable is used as transmission media.
Week 6	• Test system network performance when use LED as an optical source.
Week 7	• Test system network performance when use LSER as an optical source.
Week 8	• Mid-Exam, test system network performance for different receivers.
Week 9	• Use loop mirror connection with network under test.
Week 10	• Wavelength Division Multiplexing (WDM) Design.
Week 11	• Mid-Exam, Review and revision.
Week 12	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Optical networks A Practical Perspective, Rajiv Ramaswami Kumar N. Sivarajan Galen H. Sasaki, 3rd Edition.	No
Recommended Texts	Optical Communications and Networking, Pan, Zhongqi Wang, Qiang, Yue, Yang Huang, Hao, 2020	No
Websites	https://www.lifitn.com/im-new	

Grading Scheme مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Graduation Project and Research Methodology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GPRM 4206**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		4	**Semester of Delivery**		8
Administering Department		NE	**College**	Type College Code	
Module Leader	Dr. Omar Hussein Salman		**e-mail**	Omar.salman@aliraqia.edu.iq	
Module Leader's Acad. Title		Assoc. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**GPRM 4105**	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course will enable the students to: 1. Acquire knowledge on the key concepts, terminologies, methods, techniques, and tools in conducting research relevant to Information Technology and/or Information Systems. 2. Demonstrate knowledge and skills in writing a research paper. 3. Recognize the importance of research in the fields of Computing and Information Science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will be able to: 1. Design new model. 2. Design an appropriate data collection instrument. 3. Analyze quantitative and qualitative data using appropriate computer software (e.g. R, IBM SPSS, Excel, NVivo, etc.). 4. Interpret research findings. 5. Demonstrate research results. 6. Produce a research project report.
Indicative Contents المحتويات الإرشادية	This course contains the following topics: 1. Introduction to Research Methodology 2. Approaches to Research 3. Planning the Research Project 4. Reading, Referencing and the Management of Information 5. Literature Searching 6. The Review of the Literature 7. Research Design 8. Sampling Design 9. Methods of Data Collection 10. Measurement and 11. Scaling Techniques 12. Processing and Analysis of Data 13. Interpretation 14. Writing the Report

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this course, the instructor can follow the following strategies: • Classroom Teaching, • Self-Study, • Group Work on finding and organizing references, • Oral Presentation

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	Quiz 1	1	5% (5)	2	1,2
	Quiz 2	1	5% (5)	8	1,2,3,4
	Literature Review	1	10% (10)	4	1,2,3,4,5
	Research Proposal	1	10% (10)	9	1,2,3,4,5,6
	Data Collection Instrument	1	10% (10)	2 and 12	7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	1,2,3,4,5,6
	Final Exam Presentation	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Methods of Data Collection**
Week 2	**Measurement and Scaling Techniques**
Week 3	**Processing and Analysis of Data**
Week 4	**Interpretation**
Week 5	**Data analyses**
Week 6	**Model system design**
Week 7	**Mid Term**
Week 8	**Defining Simulation Environment**
Week 9	**Model Simulation**
Week 10	**Collecting results**
Week 11	**Results Visualization**
Week 12	**Results Discussion**
Week 13	**Writing Report Draft**
Week 14	**Writing the Full-length Report**
Week 15	**Presentation Skills**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Bell, J., & Waters, S. (2014). Doing Your Research Project : A Guide for First-time Researchers (Vol. Sixth edition). Maidenhead, Berkshire, England: McGraw-Hill Education. Retrieved from:	No
Recommended Texts	Research Methodology: A Step by-Step Guide for Beginners 5th Edition by Ranjit Kumar, SAGE Publications Ltd; 5th edition (December 10, 2018)	No
Websites	https://search.ebscohost.com/login.aspx?direct=truedb=e000xww&AN=937946&site=eds-live	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Soft Computing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**SOCO 4201**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		4	**Semester of Delivery**		Eight
Administering Department		NE	**College**		
Module Leader	Zainab abbas fadil		**e-mail**	Drzainababbas13@gmail.com	
Module Leader's Acad. Title		PH.D	**Module Leader's Qualification**		PH.D
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MALE 4104 (Machine learning)	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1.Study basic principles, techniques and applications of soft computing, 2. Study the concepts and algorithms involved in neural networks, 3. Explain Artificial Neural Networks and its categories, 4. Design NN based solutions for real world and engineering problems, 5. Apply and analyzes various neural network architectures and learning rules. 6. Study the concepts and algorithms involved in evolutionary computation (Genetic algorithm and Genetic Programming) and fuzzy logic. 7. Apply genetic algorithms to provide solutions to real world problems. 8. Identify crisp and fuzzy sets theories. 9. Introduce fuzzy systems and its applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this course the student will learn the following: 1. Learn about soft computing techniques and their applications 2. Analyze various neural network architectures 3. Understand perceptron and counter propagation networks. 4. Understand the genetic algorithm concepts and their applications. 5. Analyze the genetic algorithms and their applications. 6. Define the fuzzy systems. 7. Identify and select a suitable Soft Computing technology to solve the problem construct a solution and implement a Soft Computing solution
Indicative Contents المحتويات الإرشادية	• Introduction to Artificial neural networks. • connections of biological neurons as weights between nodes. • Utilizing artificial intelligence (AI) to solve Real-World problem.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Main strategies will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Theory-Based Lectures. • Practical sessions. • Discussion groups. • Seminars. • Projects.

tudent Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	3	10% (10)	2, 8, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	3	10% (10)	3, 6, 9	LO # 2, 5, and 8
	Report	2	10% (10)	4, 9	LO # 5 and 10
Summative assessment	**Midterm Exam**	2 hours	10% (10)	7	LO # 1-7
	Final Exam	3 hours	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Soft Computing. Biological and artificial neurons, classifications of artificial neural networks
Week 2	Concept exploration of Neural networks, Genetic algorithm, and Fuzzy logic
Week 3	Types of NN Activation Functions and Neuron response calculation
Week 4	NN Learning Algorithms and Decision Boundary
Week 5	Hebbian, Perceptron and Delta Learning Rules
Week 6	Back Propagation NN
Week 7	Hopfield Network
Week 8	10 Bidirectional Associative Memory (BAM) NN
Week 9	Adaline Neural Network
Week 10	Kohonen Network
Week 11	Genetic Algorithms (GA) concept and algorithm
Week 12	Chromosome encoding and selection techniques
Week 13	GA operators and their types
Week 14	Basic elements of fuzzy system, Universe of discourse, and crisp and fuzzy sets definitions
Week 15	Types of fuzzy membership functions, Fuzzy Relations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Create a Simple Neural Network
Week 2	Lab 2: Perform Neural Network Scenario
Week 3	Lab 3: Create a perceptron with appropriate number of inputs and outputs
Week 4	Lab 4: Perform Back Propagation NN
Week 5	Lab 5: Activation Functions (Sigmoid)
Week 6	Lab 6: Fitness Functions
Week 7	Lab 7: Types of fuzzy membership functions, Fuzzy Relations

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Aliev,R.A, Aliev,R.R., Soft Computing and its Application, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4700-1 • 2- Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook, Springer, 1st Edition, 2018, -13 : 978-3319944623 • 3- S.N. Sivanandam& S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011	No
Recommended Texts	• 1- J. Fodor and R. Fuller (Eds.). Advances in Soft Computing, Intelligent Robotics and Control. Springer, 2014 • 2- F. O. Karray and C. W. Silva. Soft Computing and Intelligent Systems Design: Theory, Tools and Applications. 1st Edition Addison-Wesley, 2004. • 3- Alan Casey, Soft Computing: Developments, Methods and Applications, Nova Science Publishers, Inc.; UK ed. edition (15 June 2016), ISBN-13: 978-1634851336.	No
Websites	None	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

توزيع المواد الدراسية للعام الدراسي ٢٠٢٦- ٢٠٢٧ الفصل الدراسي الأول
قسم هندسة الشبكات والامن السيبراني

ت	اسم المادة	نظري	عملي	المرحلة	الاستاذ
	الثانية				
١	Mathematics |||	✓			م.م دعاء صبحي
٢	Digital Electronic	✓	✓		م.م اسراء مجيد + (م.م اروى عبد الكريم عملي)
٣	Fundamentals of Cybersecurity	✓			ا.م.د احمد يونس
٤	Object Oriented Programming OOP	✓	✓		م.م سرى ناصر
٥	Communication |	✓	✓		ا.م زهراء خضير نظري + (م.م مصطفى محمد عملي)
٦	Applied Numerical Methods and Statistical Analysis for Engineers	✓			م.د شيماء بدر ياس
٧	Crimes of the Baath Refime in Iraq	✓			أ.م.د عمار مزعل +م.م عبد الجبار
	الثالثة				
١	Advance Mathematics |	✓			أ.م.د احمد يونس
٢	Computer Architecture & Microprocessor	✓	✓		م.د محمد عبد المنعم + (أ.م.د أمجد او م.د زينب عباس عملي)
٣	Optical Communication	✓	✓		أ.م.د اروى عامر + ا.د مظفر حسين
٤	Digital Signal Processing	✓			أ.م.د محمود جلال
٥	Cybersecurity management: compliance and convenience	✓	✓		م.د حسن فلاح
٦	Cybercrime and Cyber law	✓			أ.م.د حسن محمد محي الدين + ا.م.د علي سالم
	الرابعة				
١	Network Protocol	✓	✓		ا.د ساطع حكمت
٢	Queueing Theory	✓			م.م ميس عفيف
٣	Mobile Communication	✓			أ.م.د غسان أكرم
٤	Machine Learning	✓	✓		م.م يوسف حسين
٥	Software Engineering	✓			أ.م.د أمجد

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COMM2202				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Network engineering		**College**	College of engineering	
Module Leader	Zahraa Khduair Taha		**e-mail**	Zahraa.Khduair @aliraqia.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Communication I	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. understanding of the Concept of data compression, entropy, and compressibility 2. know different types of coding 3. how can perform text/ image code
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying signal coding and theory. 2. Determine the appropriate compression method for a given signal/data. 3. Realize the compression according to the lossy/ lossless requirements. 4. Understanding of image/text coding
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Concept of data compression Entropy and compressibility Shannon and Huffman codes arithmetic coding Sequence coding. Prediction. Mid-term Exam quantization and its optimization. Vector quantization Signal spaces Wavelet transforms Bit assignment and coding efficiency. Image/sound/video coding Text coding

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Digital Communication Strategies: 1. Signal Conditioning: Digital signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Bandwidth Optimization: Digital signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth.

	3. Noise Reduction: Digital signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	1, 2 and 3	LO #1, #2 and #3
	Assignments	2	10% (10)	2, 3 and 4	LO #2, #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Concept of data compression
Week 2	Entropy and compressibility
Week 3	Shannon and Huffman codes
Week 4	arithmetic coding

Week 5	Sequence coding.
Week 6	Prediction.
Week 7	Mid-term Exam
Week 8	quantisation and its optimisation.
Week 9	Vector quantization
Week 10	Signal spaces
Week 11	Wavelet transforms
Week 12	Bit assignment and coding efficiency.
Week 13	Image/sound/video coding
Week 14	Text coding (part1)
Week 15	Text coding (part2)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: data compression
Week 2	Lab 2: Shannon and Huffman codes
Week 3	Lab 3: Arithmetic coding.
Week 4	Lab 4: Sequence coding.
Week 5	Lab 5: wavelet transform
Week 6	Lab 6: Text coding
Week 7	Lab 7: image coding

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Signal Coding and Processing, 2nd edition, 2012	Yes
Recommended Texts	Multimedia Signal Coding and Transmission	No
Websites	https://www.coursera.org/learn/ coding	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
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	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Network I**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	CONE 2204				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2		**Semester of Delivery**	2	
Administering Department	NETWORK		**College**	ENGINEERING	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course covers various aspects of networking, including the introduction to networking, networking devices, networking protocols, different layers of the OSI model, network addressing, network security, troubleshooting, router configuration, home networking, and concludes with a networking capstone project and a final exam.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn the basic and applied concepts of Computer Network with the following fundamentals: 1. Define and explain the concept of networking, including its historical development and importance in modern technology. 2. Identify and describe different types of networks, such as LANs, WANs, and MANs, and understand their characteristics and uses. 3. Recognize and explain the functions and features of networking devices, including routers, switches, and hubs. 4. Understand and apply various networking protocols, such as those based on the OSI and TCP/IP models, and explain their role in network communication. 5. Configure and troubleshoot networking devices, including routers, switches, and hubs, to ensure proper connectivity and functionality. 6. Implement network security measures, including firewalls, intrusion detection systems, and encryption, to protect network resources and data. 7. Apply troubleshooting methodologies based on the OSI model and TCP/IP model to diagnose and resolve network issues. 8. Configure network addressing using IPv4, including subnetting and Variable Length Subnet Masking (VLSM), to optimize IP address allocation. 9. Demonstrate knowledge of different network cable types, such as Ethernet, fiber optic, and coaxial cables, and their appropriate usage. 10. Design and implement a network using static and dynamic routing protocols, considering factors such as scalability and efficiency. 11. Manage and monitor networking environments, including DHCP and DNS protocol configuration, to ensure smooth network operation. 12. Configure VLAN networks to segregate and manage network traffic efficiently. 13. Understand and follow Cisco router configuration using Command-Line Interface (CLI) commands. 14. Implement and secure home networks, including selecting appropriate devices and implementing security measures. 15. Design and implement a networking capstone project that demonstrates the integration of networking concepts and skills.
Indicative Contents المحتويات الإرشادية	The student will learn the basic and applied concepts of Computer Network with the following fundamentals:

	• Definition and importance of networking • Historical development of networking • Types of networks: LANs, WANs, MANs • Functions and features of routers • Functions and features of switches • Functions and features of hubs • Overview of the OSI model • Overview of the TCP/IP model • Explanation of common networking protocols • Functionality and protocols of the OSI application layer • Detailed study of application layer protocols like HTTP, SMTP, FTP • Functionality and protocols of the OSI transport layer • Comparison of TCP and UDP protocols • Role and responsibilities of the OSI network layer • Introduction to IPv4 and IPv6 addressing • IP address allocation and subnetting techniques • Assigning IPv4 classes • Subnetting and Variable Length Subnet Masking (VLSM) • Functions and protocols of the OSI data link layer • Introduction to MAC addresses, Ethernet, and VLANs • Functions and protocols associated with the OSI physical layer • Overview of Ethernet, fiber optic, and coaxial cables • Introduction to network security and its components • Configuring firewalls • Implementing intrusion detection systems • Encryption techniques and protocols • Troubleshooting methodologies based on the OSI model • Troubleshooting TCP/IP-related issues • Network device troubleshooting techniques • Introduction to the Cisco command-line interface (CLI) and commands • Configuration of interface ports on Cisco routers • Configuration of line ports (console, Telnet, SSH) • Configuring static routes • Setting up DHCP and DNS protocols • Selection and setup of home networking devices • Implementation of home networking security measures • Design and implementation of a comprehensive networking project

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class.

	2. Flip class 3. Assignment, project and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Networking** • What is networking? • The history of networking • The different types of networks
Week 2	**Networking Devices** • Routers: Functions and features • Switches: Functions and features

	• Hubs: Functions and features
Week 3	**Networking Protocols** • The OSI model: Overview and its layers • The TCP/IP model: Overview and its layers
Week 4	**OSI Application Layer** • Functionality and protocols of the OSI application layer • Detailed study of application layer protocols like HTTP, SMTP, FTP
Week 5	**OSI Transport Layer** • Functionality and protocols of the OSI transport layer • Comparison of TCP and UDP protocols
Week 6	**OSI Network Layer and IP Addressing** • Role and responsibilities of the OSI network layer • Introduction to IPv4 and IPv6 addressing
Week 7	**Midterm Exam+** IP address allocation and subnetting techniques
Week 8	**Network Addressing (IPv4)** • Assigning IPv4 classes • Subnetting and Variable Length Subnet Masking (VLSM)
Week 9	**OSI Datalink Layer** • Functions and protocols associated with the OSI Datalink Layer
Week 10	**OSI Datalink and Physical Layer** • Functions and protocols associated with the OSI Physical Layer • Overview of Ethernet cables and their categories (e.g., Cat5, Cat6) • Fiber optic cables and their advantages • Coaxial cables and their applications
Week 11	**Networking Troubleshooting** • Troubleshooting methodologies based on the OSI model • Troubleshooting TCP/IP-related issues • Network device troubleshooting techniques
Week 12	**Router Cisco Configuration** Introduction to the Cisco command-line interface (CLI) and commands Configuration of interface ports on Cisco routers
Week 13	**Router Cisco Configuration cont.** Configuration of line ports (console, Telnet, SSH) Configuring static routes Setting up DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name System) protocols on routers
Week 14	**Networking in the Home** • Introduction to home networking devices (e.g., routers, switches, wireless access points) Configuration and setup of home networks • Implementation of home networking security measures (e.g., network encryption, password protection, firewall settings)
Week 15	**Networking Capstone Project** • Design and implementation of a comprehensive networking project, integrating concepts and skills learned throughout the course.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Topology Orientation and Building a Small Network Topology Diagram.
Week 2	Lab 2: Cabling a Network and Basic Router Configuration
Week 3	Lab 3: Router configuration.
Week 4	Lab 4: Using ping command, configure Lan Network and applied subnetting.
Week 5	Lab 5: Configure VLan Networks
Week 6	Lab 6: Design Network With static and dynamic routing protocol
Week 7	Lab 7: Configure DHCP and DNS protocol

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Title: Networking: The Complete Reference Author: Todd Lammle	No
Recommended Texts	Title: Cisco CCNA: Routing and Switching Study Guide Author: Wendell Odom	No
Recommended Texts	Title: Network Security: A Beginner's Guide Author: Stuart McClure	NO
Recommended Texts	Title: Cisco IOS Configuration Fundamentals Command Reference Organization: Cisco Systems Inc.	NO
Websites	https://www.cisco.com/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Database Systems**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	DASY 2203				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	NE		**College**	Type College Code	
Module Leader	Sura Nasser Maryoush		**e-mail**	Suranasser16@yahoo.com	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	MSC	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To understand the different issues involved in the design and implementation of a database system 2. To study the physical and logical database design, and data models. 3. To understand the basic concepts of relational data model 4. To understand and use SQL with relational databases 5. To be able to retrieve specific data from a database by using queries and subqueries . 6. To manipulate data by using SQL. 7. To Be able to understand and create E/R diagrams 8. To understand and implement database applications 9. To Be able to normalize databases and tables 10. To understand indexing and hashing methods
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the importance of database systems 2. Have a broad understanding of database concepts and database management systems 3. Understand the relational data model and be able to write schema, and draw the schema diagram 4. Be able to reason about dependencies in a relational schema 5. Use relational query languages such as SQL 6. Write SQL queries for a given context in relational databases 7. Analyze the problems and Be able to create E/R diagrams and specify the relation between the entities to represent simple database application scenarios. 8. Understand normal forms, and the decomposition process by which normal forms are obtained 9. Understand indexing methods including B+ tree, and Hashing 10. Be able to design and implementation of a database for a real world application
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • File system, file system limitations • Databases, database management systems, DBMS responsiblities, DBMS advantages, levels of abstraction • Relational data model: the design terms, properties, attributes, records, keys, schema, schema diagram, instances. • Relational algebra and calculus • SQL: basic commands, table modification commands, queries on single or multiple relations, natural join, rename operation, string operations, set operations (intersect, union, except), null values, aggregation functions, grouping, having clause, subqueries, data modification commands (insert, update, delete), views, integrity constraints, authorization and privileges. • Entity- relationship data model: entities, attributes types, relations, E/R diagram representation, weak entity, strong entity.

	• Normalization: 1NF, 2NF, 3NF • Indexing: sparse Indexing, dense Indexing, multilevel Indexing, B+ tree, hashing, dynamic hashing, static hashing, operation in hashing.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Two main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and developing skills. This will be achieved through classes, interactive discussions and by considering types of simple practical implementing of codes and programs: • Theory based lectures: the traditional classroom lectures are used to present models, topics, concepts, and methods of database systems, which will be explained by examples, also, the students will be engaged in discussions to foster understandings . • Laboratary experiments: in the laboratary session, the students will be able to use the available softwares to create, implement, and modify databases and tables of any field of life , and be familiar with database implementation issues, also gain problem solving skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 11	LO #1, #2, #3,#4 and #5, #6
	Assignments	2	10% (10)	2 and 12	LO #1, #2,#3 and #7, #8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #7, #8
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to databases, file systems, databases, DBMS, levels of abstraction
Week 2	Data models, relational data model, schema and schema diagram.
Week 3	Relational algebra and calculus.
Week 4	Introduction to SQL , Basic SQL commands
Week 5	simple Queries from single and multiple relation, natural join
Week 6	Additional basic operations, set operations, Null values in SQL
Week 7	Mid exam + Aggregation functions
Week 8	Aggregation functions with grouping in SQL, Having clause with grouping
Week 9	nested subqueries in SQL, set membership, set comparison, subqueries in the From Clause
Week 10	Modification on the database commands , views in SQL.
Week 11	Integrity constraints, authorization in SQL
Week 12	Database application development, connecters.
Week 13	Entity – Relationship data model, mapping cardinalities, E/R diagram representation
Week 14	Database Normalization, 1NF, 2NF, 3NF
Week 15	Indexing and Hashing
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Mysql workbench, installing and creating server connections
Week 2	Lab 2: creating database and tables, insert, delete, update data and tables using Mysql workbench
Week 3	Lab 3: creating Database and tables using SQL
Week 4	Lab 4: queries on data using SQL
Week 5	Lab 5: queries on more than one table, using natural join in queries
Week 6	Lab 6: applying basic operation in SQL
Week 7	Lab 7: applying set operation on data using SQL
Week 8	Lab 8: using aggregation functions to retrieve data in SQL
Week 9	Lab 9: subqueries in SQL
Week 10	Lab 10: data modification on data tables using SQL
Week 11	Lab 11: view creation by using SQL
Week 12	Lab 12: integrity constraints and privileges of the database using SQL
Week 13	Lab 13: E/R diagram construction using Mysql Workbench

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Database System Concepts ", Abraham Silberschatz, Henry F. Korth,S. Sudarshan, 7th edition 2020 , ISBN 978-0-07-802215-9 • “Fundamentals Of Database Systems”, ramez elmasri, shamkant b. navathe, seventh edition, 2016, ISBN-13: 978-0-13-397077-7	No
Recommended Texts	“Database Management Systems”, Raghu Ramakrishnan, third edition, 2003	No
Websites	www.mysql.com https://www.w3shool.com	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics IV**			**Module Delivery**	
Module Type	**Basic**			☒**Theory**	
Module Code	Code			☐ **Lecture**	
ECTS Credits	**4**			☐**Lab**	
SWL (hr/sem)	**100**			☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	Omar Hassan Hameed		**e-mail**	Omar.Hassan @aliraqia.edu.iq	
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mathematics I	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of complex numbers and their properties. 2. Understand the differentiation and integration of inverse trigonometric functions. 3. Understand the differentiation and integration of hyperbolic trigonometric functions. 4. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 5. Identify integration applications such as Area under curve and area between two curves. 6. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 7. Understand polar coordinates and their properties. 8. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part • Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve

	• Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties • Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5

	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Ordinary differential equation – first order- variable separable
Week 2	Ordinary differential equation – first order- homogenous
Week 3	Ordinary differential equation – first order- Exact
Week 4	Ordinary differential equation – first order - Linear
Week 5	Ordinary differential equation – second order – undetermined coefficient
Week 6	Ordinary differential equation – second order – variation of parameter
Week 7	Ordinary differential equation – higher order
Week 8	**Mid-term Exam**
Week 9	Laplace transform - properties
Week 10	Inverse Laplace transform
Week 11	Solving Ordinary differential equation using Laplace transform
Week 12	Z - transform
Week 13	Z - transform properties
Week 14	Inverse Z - transform
Week 15	Inverse Z – transform (PART2)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Infrastructure Attack and Defense			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	IADF 4204				
ECTS Credits	**6**				
SWL (hr/sem)	**94**				
Module Level	UGIV		**Semester of Delivery**	Eight	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Asst. Lec. Yousif Hosain Dakhil		**e-mail**	yousefhusaindakhel@gmail.com	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Master	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Network Security (NESE4203)	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Provide comprehensive knowledge about infrastructure vulnerabilities, attack methodologies, and defense mechanisms. 2. Develop advanced analytical and practical skills in identifying, analyzing, and mitigating infrastructure attacks. 3. Train students in Red Team (offensive) and Blue Team (defensive) strategies, integrating theory and real-world practice. 4. Enhance an understanding of real-world case studies, incident response management, and security auditing frameworks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify, analyze, and critically evaluate infrastructure threats, vulnerabilities, and attack vectors. 2. Apply Red Team techniques for infrastructure reconnaissance, penetration testing, and exploitation. 3. Implement effective Blue Team defense mechanisms, including firewalls, IDS/IPS, incident response frameworks, and SIEM solutions. 4. Conduct in-depth security audits and penetration testing to proactively protect infrastructure. 5. Evaluate real-world attack scenarios and propose comprehensive defense strategies and recovery plans.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Infrastructure Security** • Key concepts, infrastructure components, and significance • Cybersecurity fundamentals: CIA triad in infrastructure contexts **2. Threat Landscape Analysis** • Types of infrastructure attacks (DDoS, ransomware, APT) • Recent trends, real-world case studies, and attack vectors

	3. Offensive Strategies: Red Team Fundamentals • Reconnaissance and footprinting • Network scanning and enumeration methods **4. Exploitation Techniques** • Application and network-layer exploits • Privilege escalation and lateral movement **5. Denial of Service (DoS) Attacks** • Attack methodologies and detection techniques • Mitigation strategies and real-world scenarios **6. Advanced Persistent Threats (APTs)** • Lifecycle analysis of APTs • Defensive countermeasures and response plans **7. Malware and Ransomware Defense** • Identification, containment, and removal • Proactive measures and threat intelligence integration **8. Firewall and Access Controls II** • Implementation and configuration (ACLs, rulesets) • Network segmentation strategies **9. Intrusion Detection and Prevention Systems (IDS/IPS)** • Deployment, configuration, and management • Real-time monitoring and alerting strategies **10. Security Information and Event Management (SIEM)** • Log analysis, correlation, and incident management • Integration with incident response protocols **11. Penetration Testing and Vulnerability Assessment** • Methodologies, tools (Metasploit, Kali Linux) • Comprehensive vulnerability management **12. Security Information and Event Management (SIEM)** • Standards (ISO 27001, NIST)

	• Continuous monitoring and reporting techniques **13. Security Information and Event Management (SIEM)** • Incident handling lifecycle (preparation, detection, containment, recovery) • Developing effective incident response plans **14. Red and Blue Team Integration** • Combined tactical exercises • Scenario-based training and evaluation **15. Real-world Case Study Projects** • Integrated attack-defense case studies • Team presentations and evaluations

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Structured theoretical lectures combined with hands-on lab sessions. 2. Interactive class discussions emphasizing real-world attack-defense scenarios. 3. Regular quizzes and assignments for formative assessment. 4. Collaborative projects involving both offensive (Red Team) and defensive (Blue Team) strategies. **5.** Integration of professional security tools (Wireshark, Snort, Kali Linux) and scenario simulations based on real-world threats.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem)	94	**Structured SWL (h/w)**	6.27

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3,4 and 5
	Assignments	2	10% (10)	4, 10	LO # 4 and 5
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 3, 4 ,and 5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 5
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Infrastructure Security: Components, Concepts, and Significance

Week 2	Infrastructure Threat Landscape: Attack Trends, Tactics, and Case Studies
Week 3	Red Team Methodologies: Reconnaissance and Footprinting Techniques
Week 4	Red Team: Advanced Network Scanning and Enumeration Methods
Week 5	Red Team: Exploitation Techniques at Network and Application Layers.
Week 6	Red Team: Denial of Service (DoS/DDoS) Attacks – Detection and Real-World Examples
Week 7	Red Team: Advanced Persistent Threats (APT) and Lateral Movement Techniques
Week 8	Midterm Exam
Week 9	Blue Team: Ransomware and Malware Defense Strategies and Tools
Week 10	Blue Team: Firewall Configurations, Access Controls (ACLs), and Defense Mechanisms
Week 11	Blue Team: Intrusion Detection/Prevention Systems (IDS/IPS), Deployment, and Best Practices
Week 12	Blue Team: Security Information and Event Management (SIEM) & Effective Incident Response
Week 13	Penetration Testing and Comprehensive Vulnerability Assessment
Week 14	Security Auditing, Compliance Standards (ISO27001, NIST), and Continuous Monitoring
Week 15	Security Auditing, Compliance Standards (ISO27001, NIST), and Continuous Monitoring
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**1.** William Stallings, Cryptography and Network Security: Principles and Practice, 8th ed., Pearson, 2020. **2.** Eric Conrad, Seth Misenar, Joshua Feldman, CISSP Study Guide, 4th Edition, Elsevier, 2019.	No

	3. Erdal Ozkaya & Yuri Diogenes, Cybersecurity – Attack and Defense Strategies: Infrastructure Security with Red Team and Blue Team Tactics, Packt Publishing, 2018.	
Recommended Texts	1. NIST SP 800-61, Computer Security Incident Handling Guide. 2. OWASP Testing Guide v5.	No
Websites	1. MITRE ATT&CK Framework (attack.mitre.org) 2. OWASP Foundation (www.owasp.org) 3. NIST Cybersecurity Framework (www.nist.gov/cyberframework)	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Cybercrime and Cyber law			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	CCCL3106			☐ **Lecture**	
ECTS Credits	**3**			☐ **Lab**	
SWL (hr/sem)5	**75**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	UGIII	**Semester of Delivery**	Six		
Administering Department	Type Dept. Code	**College**	Type College Code		
Module Leader	Lec. Hasan Falah Hasan	**e-mail**	E-mail : Hasanfalahhasan@aliraqia.edu.iq		
Module Leader's Acad. Title	Ass.Lec.	**Module Leader's Qualification**	Master		
Module Tutor	Name (if available)	**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	01/06/2025	**Version Number**	1.0		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Understand the nature and scope of cybercrime in the digital era. • Explore national and international cyber laws and policy frameworks. • Analyze legal gaps and propose new legal mechanisms or cybersecurity policies. • Learn about digital forensics and enforcement practices. • Examine ethical, social, and legal implications of cybersecurity operations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. **Knowledge & Understanding** • **Identify and explain** the key types of cybercrimes, including technical, financial, and state-sponsored attacks. • **Describe** the legal frameworks governing cybercrime in the UK, EU, and international contexts (e.g., Computer Misuse Act, GDPR, Budapest Convention). • **Understand** the principles of evidence collection, digital forensics, and the admissibility of digital evidence in court. 2. **Cognitive Skills** • **Critically evaluate** national and international cyber laws and their effectiveness in addressing emerging cyber threats. • **Analyze** real-world cybercrime cases to identify legal and policy shortcomings. • **Compare** different legal responses to cybercrime across jurisdictions. 3. **Practical & Legal Skills** • **Demonstrate** the use of digital forensic tools for cybercrime investigation (e.g., FTK, Autopsy). • **Apply** legal reasoning to interpret statutes and propose amendments to outdated cyber laws. • **Draft** and present policy briefs or law reform proposals in response to current cybersecurity challenges. 4. **Communication & Teamwork** • **Engage** in structured debates and mock legislative processes on

	controversial cyber law topics. • **Collaborate** with peers to develop simulated legislation, policy recommendations, and investigation strategies. • **Present** clear, well-reasoned arguments in written and oral formats, grounded in legal and ethical analysis.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Cybercrime** • Definitions and classifications of cybercrime • Motivations of cybercriminals (e.g., financial, political, ideological) • Cybercrime trends, statistics, and global threat landscape • The cybercrime ecosystem (dark web, anonymity tools, etc.) **2. Legal Frameworks and Cyber Law** • UK cyber legislation: Computer Misuse Act 1990, Data Protection Act 2018 • EU legislation: NIS2 Directive, GDPR, ePrivacy Directive • International legal instruments: Budapest Convention, Tallinn Manual • Jurisdictional challenges and cross-border legal cooperation **3. Criminal Liability in Cybercrime** • Elements of cyber offences (unauthorized access, DDoS, malware distribution) • Criminal liability for individuals, organizations, and states • Case studies: R v Love, R v Gold and Schifreen, Aaron Swartz case **4. Digital Evidence and Forensics** • Types of digital evidence: logs, emails, hard disk images, network traffic • Chain of custody, integrity preservation, metadata analysis • Forensics tools (FTK, EnCase, Autopsy) • Evidence admissibility (UK PACE Act, ACPO Guidelines) **5. Cybercrime Investigation and Enforcement** • Investigation processes: search, seizure, analysis, reporting • Role of law enforcement (NCA, Europol EC3, INTERPOL) • Mutual legal assistance treaties (MLATs) • Public-private cooperation in investigations **6. Surveillance, Privacy, and Ethics** • Legal surveillance powers (Investigatory Powers Act 2016) • Privacy rights under GDPR and ECHR • Ethical dilemmas in digital investigations • Government access to encrypted data **7. Policy-Making in Cybersecurity** • Cybersecurity strategy formulation (UK National Cyber Strategy) • Stakeholders in cyber policy: government, civil society, tech industry • Lifecycle of legislation and regulatory reform • Public consultations and white paper drafting **8. Legal and Policy Reform** • Identification of gaps in existing laws • Law reform theory and process • Drafting cybercrime-related legislative amendments • Model protocols for data sharing and evidence exchange **9. Cybersecurity and Critical Infrastructure Protection** • Cyber threats to power grids, healthcare, and telecoms • Incident response and public safety

	• National defense frameworks (NIS2, UK NCSC guidance) • State responsibility for cyberattacks (Tallinn Manual principles) **10. Economic and Financial Cybercrime** • Phishing, social engineering, business email compromise (BEC) • Cryptojacking, crypto scams, darknet transactions • Anti-money laundering (AML) and FATF compliance • EU's MiCA (Markets in Crypto-Assets) regulation **11. Emerging Issues** • Deepfakes, AI-generated misinformation, and legal gaps • Smart contracts and decentralized finance (DeFi) fraud • Post-quantum cybersecurity and future legal implications **12. Case Studies, Mock Trials & Law Drafting** • In-depth analysis of cases: Cambridge Analytica, WannaCry, Colonial Pipeline • Legislative simulation: propose, debate, and amend student-generated bills • Team-based presentations of policy or law proposals
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:** • **Lectures and Interactive Discussions**: Weekly theoretical lectures covering legal, technical, and policy concepts, supported by multimedia content and real-world examples. • **Case Study Seminars**: In-depth group discussions and analysis of major cybercrime cases and legal precedents to encourage critical thinking. • **Mock Trials and Legal Debates**: Students simulate court proceedings and debate controversial cyber laws to develop legal reasoning and argumentation skills. • **Law and Policy Drafting Workshops**: Students draft short legal amendments or cybersecurity policy proposals in response to current threats. • **Assignments and Reflective Journals**: Regular written tasks and reflection logs to assess understanding of legal principles and evolving threats. • **Group Projects and Presentations**: Collaborative work on comparative legal systems, threat analysis, or proposed reforms, culminating in a class presentation. • **Quizzes and Online Activities**: Periodic quizzes and virtual simulations to reinforce knowledge of law, enforcement procedures, and cyber threat types.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	All
	Assignments	2	10% (10)	4, 10	All
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	All
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Module 1: Introduction to Cybercrime and Cybersecurity (Week 1)** • Cybercrime categories: individual, organizational, state-sponsored • The cyber threat landscape: attackers, victims, ecosystems • Introduction to cybersecurity policy and regulatory frameworks
Week 2-3	**Module 2: Foundations of Cyber Law and International Frameworks** National laws: UK (Computer Misuse Act, DPA 2018), EU (NIS2 Directive, GDPR) • International laws: Budapest Convention, Tallinn Manual (cyber warfare) • Legal harmonization challenges • Comparative analysis of UK vs EU frameworks.
Week 4	**Module 3: Cybercrime and Criminal Law** • Liability: individuals, corporations, state actors

	• Case studies: Lauri Love, R v Aaron Swartz • Cybercriminal profiling and motivation • Law Proposition Focus: Draft an amendment to the Computer Misuse Act.
Week 5-6	**Module 4: Digital Evidence and Forensics** • Technical and legal challenges of digital evidence • Chain of custody, hashing, metadata integrity • Standards for evidence admissibility (UK, EU). • Evaluate and propose standards for cloud evidence admissibility.
Week 7	**Midterm Exam + Project Guidance**
Week 8	**Module 5: Investigation and Enforcement** • Role of national agencies (NCA, Europol EC3) • International cooperation (MLATs, INTERPOL cybercrime unit) • Problems of jurisdiction and real-time response • Model international protocol for cyber evidence exchange
Week 9	**Module 6: Privacy, Surveillance, and Ethics** • Surveillance laws: Investigatory Powers Act, GDPR rights • Tension between privacy and public interest • Law Proposition Focus: Propose a balanced surveillance oversight law.
Week 10	**Module 7: Cybercrime and Critical Infrastructure** • Nation-state attacks: APTs, ransomware on healthcare and utilities • Attribution challenges and legal loopholes • Develop a legal strategy for critical infrastructure protection
Week 11	**Module 8: Financial Cybercrime and Blockchain** • Cryptocurrency fraud, dark markets, NFT scams • AML compliance, FATF guidelines, MiCA (EU crypto regulation). • Policy Lab: Design a national policy on cryptocurrency tracing.
Week 12	**Module 9: Policy-Making in Cybersecurity** • How laws are made: lobbying, white papers, consultations • Stakeholder perspectives: government, industry, civil society • Workshop: Students form policy teams to draft short legislative white papers
Week 13	**Module 10: Proposing Cyber Law Reform** • Identify weaknesses in current laws • Legal innovation: from GDPR to AI regulation • Group Assignment: Draft a new cybercrime statute or reform proposal
Week 14	**Module 11: Case Studies and Mock Legislation Debates** • Deep dive into real cases (WannaCry, NotPetya, Cambridge Analytica) • Simulate a government hearing on proposed cyber law reforms • **Mock Committee**: Debate and amend proposed student laws.

Week 15	**Module 12: Final Project Presentations & Feedback (Week 14)** • Group presentations on drafted policies/laws • Peer critique and instructor feedback. • Final course summary and policy outlook discussion
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• **Information Technology Law by Ian J. Lloyd:** A classic UK/EU text. Covers IT law, privacy, cybercrime, AI, and surveillance, 9th Edition (2021). • **Cyber Crime and Digital Evidence by Jonathan Clough:** Detailed exploration of cyber offences and evidentiary challenges, including hacking, malware, and digital forensics, 3rd Edition (2021). • **Computer Forensics: Cybercriminals, Laws and Evidence by Marie-Helen Maras:** Combines digital forensics with law and procedure. Ideal for practical labs and policy discussions, 2nd Edition (2014).	
Recommended Texts	• Information Technology Law by Ian J. Lloyd. • Cyber Crime and Digital Evidence by Jonathan Clough.	
Websites	1. **UK National Cyber Security Centre (NCSC):** https://www.ncsc.gov.uk 2. **Council of Europe – Budapest Convention on Cybercrime:** https://www.coe.int/en/web/cybercrim 3. **Legislation.gov.uk:** *https://www.legislation.gov.uk* 4. **Eur-Lex: Access to EU Law:** https://eur-lex.europa.eu	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Ethical Hacking			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ETHA 4104**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ass.Prof. Hassan M. Muhialdeen		**e-mail**	E-mail : muhialdeen.hassan@aliraqia.edu.iq	
Module Leader's Acad. Title	Professor Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name			**e-mail**	E-mail :	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Cybersecurity Fundamentals, Operating Systems and Applications, Computer Networks, Python Programming in Cyber security.	**Semester**	
Co-requisites module	Cybercrime and Cyber law	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• To understand the nature of security threats and vulnerabilities in information systems, networks, and applications. • To provide hands-on experience using industry-standard tools (e.g., Nmap, Metasploit, Wireshark, Burp Suite). • To understand the mindset and methods of malicious hackers to better defend systems. • To identify and patch vulnerabilities through penetration testing and risk assessment. • To enhance investigative and decision-making skills under simulated attack conditions. • To prepare students for roles in penetration testing, red teaming, or security auditing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module Learning Outcomes (Aligned with Program Outcomes): By the end of this module, students will be able to: • Characterise the principles, concepts, and legal frameworks that govern ethical hacking practices. (Supports Outcome 1). • Demonstrate a comprehensive understanding and critical awareness of security vulnerabilities by using advanced tools and techniques to identify, analyse, and evaluate security risks. (Supports Outcome 2) • Exhibit self-direction and originality in identifying, selecting, and planning sophisticated procedures and countermeasures to defend against and minimize computer security attacks. (Supports Outcome 4) • Make and justify decisions on cybersecurity interventions, showing awareness of

	ethical, professional, and legal issues connected with hacking. (Supports Outcome 5) • Continuously advance your knowledge and skills in cybersecurity, demonstrating the ability to learn independently and develop new competencies at a high level. (Supports Outcome 6) • Critically evaluate the effectiveness of different security measures, countermeasures, and ethical hacking methodologies. (Supports Outcome 7)
Indicative Contents المحتويات الإرشادية	**1. Ethical Hacking Fundamentals** • Introduction to ethical Hacking • Foot printing **2. Target Scanning** • Scanning: Definition and Purpose • Port Scanning • Network Scanning • Vulnerability Scanning **3. Covering of Tracks** • Disable Auditing • Clearing Logs • Modifying Logs and Registry Files • Removing Folders and Files Created • Covering Track on Network **4. Targetted Attacks (Windows System)** • ARP Spoofing • Malware Attacks • Virus • Password-based Attacks **5. Targetted Attacks (Windows System)** • Side-Channel Attacks • TCP-SYN Flood Attacks • War Dialing

	6. Targetted Attacks (Linux System) • Spoofing Attacks • Scanning • Denial of Service Attacks **7. Targetted Attacks (Linux System)** • ARP Spoofing • Malware Attacks • Password-based Attacks **8. Web Servers and Web Applications** • Web Server Attacks **9. Web Servers and Web Applications** • Attacks Against Web Applications **10. Types of Attacks** • Trojans and Viruses • Spyware **11. Social Engineering and Distributed Denial of Service** • Web Server Attacks • Attacks Against Web Applications **12. Penetration Testing** • Security Audit • Risk Analysis **13. Vulnerability Assessment** • Types of Vulnerability Assessment • Network Vulnerability Assessment Process • Vulnerability Assessment Approaches **14. Penetration Testing Roadmap** • Penetration Testing Rules • Penetration testing plan

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:** 1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Types of Hackers, Phases in Hacking, Sources of Information, Advantages of Foot printing, Countermeasures against Foot Printing**
Week 2	**Phases in Scanning-TCP Handshake, Types of Port Scan, Tools for Port Scanning, Banner Grabbing, Nmap for Network Scanning, Nikto for Network Scanning, Nessus for Network Scanning, Tools and Steps Used for Vulnerability Scanning, Countermeasures Against Vulnerability Scanning**
Week 3	**Disable Auditing, Clearing Logs, Tools for Clearing Logs, Modifying Logs and Registry Files, Removing Folders and Files Created, Covering Track network**
Week 4	**Attack Method, Legitimate Usage, Detection and Prevention, Virus, Worm, Trojan Horse, Ransomware, Spyware and Adware, Password Cracking Tools**

Week 5	**Timing Attack, Power Analysis Attack, Optical Side-Channel Attack, Countermeasures Against Side-Channel Attacks, TCP-SYN Flood attack Description, Methods of Mitigation War Dialing Attack Description, War Dialing Tools**
Week 6	**Spoofing Attacks, Scanning, Denial of Service Attacks**
Week 7	**Malware Attacks, Buffer Overflow, Wiretapping**
Week 8	**Midterm Exam**
Week 9	**Denial of Service Attack, URL Interpretation Attack, Impersonation Attack, Directory Traversal, Misconfiguration Attacks**
Week 10	**Cross-Site Scripting, Website Defacement, SQL Injection, Buffer Overflow**
Week 11	**Virus Defensive Techniques, Symptoms of Trojans Infections, Trojans Defensive Techniques, Methods of Delivery and Infection**
Week 12	**Denial of Service Attack, URL Interpretation Attack, Impersonation Attack, Directory Traversal, Misconfiguration Attack, Cross-Site Scripting, Website Defacement, SQL Injection, Buffer Overflow**
Week 13	**Security Audit, Risk Analysis, Security Audit Tools, Security Audit Stages**
Week 14	**Host Vulnerability Assessments, Network Vulnerability Assessments, Network Vulnerability Assessment Process, Administrative Approach, Outsider Approach, Hybrid Appro.**
Week 15	**Penetration Testing Roadmap, Penetration Testing Rules, Penetration testing plan**
Week 16	**Penetration Testing Plan, Reconnaissance, Evaluating System Vulnerability Penetration testing**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	he Hacker Playbook 3: Practical Guide to Penetration Testing	

	Peter Kim Independentl y Published 2018 ISBN: 978 1980901754	
Recommended Texts	Gray Hat Hacking The Ethical Hackers Handbook, 6th Edition Allen Harper, Ryan Linn, Stephen Sims, Michael Baucom, Daniel Fernandez, Huascar Tejeda, Moses Frost McGraw Hill Osborne 2022 ISBN:978 1264268948	
Websites	https://www.amazon.com/Basics-Hacking-Penetration-Testing-Second/dp/0124116442 https://www.amazon.com/Penetration-Testing-Hands-Introduction-Hacking/dp/1593275641	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fundamentals of Cybersecurity			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	FOCS 2103			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Prof. Dr. Rasha Thabit		**e-mail**	E-mail : rasha.thabit@aliraqia.edu.iq	
Module Leader's Acad. Title	Professor Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Prof. Tayseer Salman		**e-mail**	E-mail : tayseer.salman@aliraqia.edu.iq	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• To introduce students to the fundamental concepts of cybersecurity, including threats, vulnerabilities, and basic defense mechanisms. • To provide a broad understanding of how to protect information systems and networks from cyberattacks. • To raise awareness of current cybersecurity challenges and best practices. • To develop critical thinking skills in evaluating security scenarios and applying basic security principles. • To prepare students for further study or entry-level roles in the field of cybersecurity.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module Learning Outcomes (Aligned with Program Outcomes): By the end of this module, students will be able to: • Identify and analyze basic cybersecurity problems and apply fundamental principles of computing and networking to propose solutions. (Supports Outcome 1) • Apply basic security design principles to develop simple defense strategies considering user safety, privacy, and technological constraints. (Supports Outcome 2) • Communicate effectively using appropriate terminology to explain cybersecurity threats, mitigation techniques, and best practices to both technical and non-technical audiences. (Supports Outcome 3) • Recognize ethical and legal responsibilities in cybersecurity and demonstrate awareness of the societal and global implications of security decisions. (Supports Outcome 4) • Collaborate in groups to complete cybersecurity case studies or mini-projects, demonstrating teamwork and shared responsibility. (Supports Outcome 5) • Interpret simple cybersecurity data such as log files or attack simulations, and draw reasoned conclusions about potential vulnerabilities. (Supports Outcome 6)

	• Demonstrate a commitment to self-learning by engaging with online platforms, tools, or cybersecurity news to stay current with emerging threats and solutions. (Supports Outcome 7)
Indicative Contents المحتويات الإرشادية	1. **Introduction to Cybersecurity** • Importance of cybersecurity • Key terms and definitions • Career paths and industry demand 2. **Understanding Threats, Attacks, and Vulnerabilities** • Types of cyber threats (malware, phishing, social engineering, etc.) • Vulnerability types and risk factors • Cyberattack lifecycle 3. **Cybersecurity Terminology and Models** • CIA triad (Confidentiality, Integrity, Availability) • Authentication, authorization, and accounting • Security models and policies 4. **Cryptography Fundamentals** • Encryption and decryption concepts • Symmetric vs. asymmetric encryption • Hashing and digital signatures 5. **Network Security Basics** • Firewalls, intrusion detection/prevention systems (IDS/IPS) • VPNs and secure communication • Network segmentation and defense-in-depth 6. **Endpoint and Application Security** • Antivirus, anti-malware, and endpoint protection • Secure coding principles and application vulnerabilities • Patching and configuration management 7. **Cloud Security Essentials** • Cloud deployment models (IaaS, PaaS, SaaS) • Cloud risks and security controls

- Shared responsibility model

8. **Security Operations and Monitoring**

   - Security operations centres (SOC)
   - Log analysis and monitoring tools
   - Incident detection and alerting

9. **Cybersecurity Governance and Risk Management**

   - Policies, procedures, and compliance
   - Risk assessment and management frameworks
   - Business continuity and disaster recovery

10. **Cybersecurity Laws and Ethics**

    - Legal frameworks and global standards
    - Ethical hacking vs. criminal hacking
    - Data protection laws (e.g., GDPR, local regulations)

11. **Cybersecurity Certifications and Careers**

    - Overview of certifications (Security+, CEH, CISSP, etc.)
    - Roles in cybersecurity (analyst, engineer, CISO, etc.)
    - Skills development and lifelong learning

12. **Emerging Trends in Cybersecurity**

    - AI and machine learning in security
    - Zero Trust architecture
    - Cybersecurity in IoT and mobile devices

13. **Security Awareness and Best Practices**

    - Strong passwords, safe browsing, email hygiene
    - Social engineering prevention
    - Personal and organizational security hygiene

14. **Case Studies and Real-World Scenarios**

    - Review of major cyberattacks (e.g., Equifax, SolarWinds)
    - Lessons learned and risk mitigation strategies
    - Group discussion and presentations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:** 1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Importance of Cybersecurity - Cyber risks, global impact, digital threat landscape**
Week 2	**Evolution of Security - From legacy to modern systems, ML and AI in cybersecurity**
Week 3	**Cybersecurity Technologies - Key tools and concepts (firewalls, IDS/IPS, SIEM, etc.)**
Week 4	**Skills Needed for a Cybersecurity Career - Technical, soft, and transferable skills**
Week 5	**Attacker Mindset - Hacker motives, techniques, red teaming/blue teaming**
Week 6	**Types of Cybersecurity - Reactive, proactive, and operational security explained**
Week 7	**Mentorship and Career Development - Networking, mentoring, shadowing in the field**
Week 8	**Midterm Exam**

Week 9	**Cybersecurity Labs (Conceptual) - Building home labs, simulation tools, ethical practice**
Week 10	**Certifications and Knowledge Validation - CEH, Security+, CISSP, CompTIA, etc.**
Week 11	**Security Intelligence Resources - Threat feeds, OSINT, dark web, staying current**
Week 12	**Expert Insights - Summary of interviews with industry professionals**
Week 13	**How to Get Hired in Cybersecurity - Resume tips, interview prep, job market trends**
Week 14	**Final Project Presentations (Career Plan or Case Study)**
Week 15	**The Future of Cybersecurity: Trends, Challenges, and Opportunities & Course Review**
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	E. Ozkaya, Cybersecurity: The Beginner's Guide, A comprehensive guide to getting started in cybersecurity. Birmingham, UK: Packt Publishing, 2019.	Yes
Recommended Texts	W. Stallings and L. Brown, Computer Security: Principles and Practice, 2nd ed. Boston, MA, USA: Pearson, 2012. C. J. Brooks, C. Grow, P. Craig, and D. Short, Cybersecurity Essentials. Indianapolis, IN, USA: John Wiley & Sons, Inc., 2018.	Yes
Websites	https://www.khanacademy.org/partner-content/nova/nova-labs-topic/cyber https://opensecuritytraining.info/ https://w3.testout.com/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Python Programming in Cyber security			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	PPCS 2205				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Lect. Abdulhakeem Qusay Albayati		**e-mail**	E-mail : abdulhakeem.q.ali@aliraqia.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Lect. Abdulhakeem Qusay Albayati		**e-mail**	E-mail : abdulhakeem.q.ali@aliraqia.edu.iq	
Peer Reviewer Name	Prof. Dr. Rasha Thabit		**e-mail**	E-mail : rasha.thabit@aliraqia.edu.iq	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	COPR 1206	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Develop core and intermediate Python proficiency so that students can confidently script, debug, and extend code bases used in modern security operations. • Equip learners to design and implement Python-based solutions—including automation scripts, packet analyzers, and reconnaissance tools—that address real-world cyber-defense challenges. • Cultivate analytical skills for identifying, investigating, and solving complex security problems through systematic data collection (e.g., packet captures, log files) and evidence-based reasoning. • Instill an understanding of ethical, legal, and professional responsibilities when applying Python to penetration testing, vulnerability research, and digital forensics. • Foster effective teamwork and communication by requiring collaborative development projects and clear technical reporting to diverse stakeholders. • Promote lifelong learning and adaptability by encouraging students to evaluate, integrate, and document new Python libraries or security frameworks as threat landscapes evolve.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Implement Python scripts to automate cybersecurity tasks and solve complex security problems. (Supports outcome 1) • Design secure Python-based solutions that meet specified cyber□defense needs while accounting for safety, environmental, and societal factors. (Supports outcome 2) • Communicate technical findings from Python□driven security analyses to diverse audiences through clear reports and presentations. (Supports outcome 3) • Recognize and apply ethical and professional responsibilities while performing Python□based reconnaissance, penetration testing, and data collection. (Supports outcome 4) • Collaborate effectively within a team to plan, develop, and manage a Python

	cybersecurity project, demonstrating leadership and inclusivity. (Supports outcome 5) • Develop and conduct experiments—such as packet capture or log‑file analysis—using Python, then analyze and interpret the data to draw evidence‑based conclusions. (Supports outcome 6) • Acquire, evaluate, and integrate new Python libraries or security frameworks as needed, demonstrating lifelong learning strategies in rapidly evolving cyber‑threat landscapes. (Supports outcome 7)
Indicative Contents المحتويات الإرشادية	1. **Introduction to Python and Cyber Security** • History of Python • What is Cyber security? • Why Python for Cybersecurity? 2. **INSTALLING PYTHON AND SETTING UP THE ENVIRONMENT** • Python Interpreter • What is IDE? and IDE installation • Setting up the environment 3. **Basic Python Syntax** • Variables and Data Types • Control Flow (if statements, loops) • Functions 4. **Advanced Python Concepts** • Lists and Tuples • Dictionaries and Sets • List Comprehension 5. **Overview of Strings, Regular Expressions & Pattern Matching** • What are strings? and Importance of string manipulation in programming • Basic String Operations (Creating strings, Accessing characters in a string and String concatenation) • `re` module and pattern search 6. **Object-Oriented Programming (OOP)**

- Classes and Objects
- Inheritance
- Encapsulation

7. **Error Handling & File Operations**

- Try/Except
- Reading/Writing Files & CSVs

8. **Introduction to Networking Concepts**

- What is a Network?
- OSI Model Overview
- Understanding TCP/IP

9. **SOCKET PROGRAMMING WITH PYTHON**

- Socket Basics
- Creating a Simple Client-Server Application
- Handling Connections and Data Transfer

10. **WEB SCRAPING**

- Introduction to Web Scraping
- Introduction to Web Scrapping Libraries
- Libraries for Web Scraping (e.g. Requests)

11. **USING PYTHON FOR RECONNAISSANCE**

- What is Reconnaissance?
- Parsing HTML Data
- Extracting Useful Data from Websites

12. **Introduction to Log File Parsing**

- What are Log Files?
- Importance of Parsing Log Files
- Why Python for Log File Parsing?
- Introduction to Python Libraries for Log Parsing

13. **Log File Structure**

- Creating a simple Log File using Notepad
- Common log file formats (e.g., CSV, JSON, plain text)
- Understanding structured vs. unstructured log files
- Log File Components

	• Identifying key components in log files (timestamp, log level, message, etc.) 14. **Reading Log Files in Python** • Opening a Log File using Python's built-in open() function • Reading a Log File • Writing to a Log File

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	**Learning and Teaching Strategies:** 1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.26
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Report	1	10% (10)	13	All
	Lab	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Python and Cyber Security**
Week 2	**INSTALLING PYTHON AND SETTING UP THE ENVIRONMENT**
Week 3	**Basic Python Syntax**
Week 4	**Overview of Strings, Regular Expressions & Pattern Matching**
Week 5	**Advanced Python Concepts**
Week 6	**Object-Oriented Programming (OOP)**
Week 7	**Error Handling & File Operations**
Week 8	**Midterm Exam**

Week 9	**Introduction to Networking Concepts**
Week 10	**SOCKET PROGRAMMING WITH PYTHON**
Week 11	**WEB SCRAPING**
Week 12	**USING PYTHON FOR RECONNAISSANCE**
Week 13	**Introduction to Log File Parsing**
Week 14	**Log File Structure**
Week 15	**Reading Log Files in Python**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	**Lab 1: Python Environment & First Security Script** • Install Python, VS Code/PyCharm. • Write a "Hello Cyber" script that prints OS, current user, date/time, and basic network info (hostname, local IP).
Week 2	**Lab 2: Secure Input, Variables & Flow Control** • Review variables, data types, loops • Implement a CLI tool that rates password entropy and stores results in CSV
Week 3	**Lab 3: Data Structures for Threat Lists** • Parse a CSV of malicious IPs/URLs into lists, tuples, sets, dictionaries. • Use set math to de-duplicate, then output JSON with counts per TLD.
Week 4	**Lab 4: Regex & IOC Extraction** • Given mixed Apache/WAF logs, use the re module to pull: • IPv4 / IPv6 • Emails and Suspicious URLs.

Week 5	**Lab 5: OOP Scanner with Robust File Handling** • Refactor Lab 3 code into a ThreatScanner class (encapsulation, inheritance). • Add try/except blocks & rotating log files (logging.handlers).
Week 6	**Lab 6: Network Fundamentals & Packet Capture** • Use Scapy to sniff ten packets, dissect Ethernet/IP/TCP layers, and mark unusual flags. • Produce a CSV summary of src/dst IPs and protocols.
Week 7	**Lab 7: Socket Programming & Web Scraping** • Part A – Echo Server/Client (TCP sockets, multithreading). • Part B – Use requests + BeautifulSoup to pull the latest CVE titles from NVD. • Combine results: log client IPs that request CVE info.
Week 8	**Lab 8: Reconnaissance & Log-Parsing Mini-Project** • Query the Shodan API (or offline JSON dump) for a small IP list. • Store banners, ports, and metadata into structured logs (JSON). • Write a Python log-parser that reads those files, filters severity ≥ "warning", and appends anomalies to a new log.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Al Sweigart (2015). Automate the Boring Stuff with Python: Practical Programming for Total Beginners. - Zaid Sabih (2018). Learn Python & Ethical Hacking from Scratch.	No

Recommended Texts	- TJ O'Connor (2012). Violent Python: A Cookbook for Hackers, Forensic Analysts, Penetration Testers, and Security Engineers. Syngress. - Justin Seitz (2014). Black Hat Python: Python Programming for Hackers and Pentesters. No Starch Press. - Sybex (2018). Python for Cybersecurity: Using Python for Cyber Offense and Defense. Sybex.	No
Websites	https://www.coursera.org/specializations/pythonforcybersecurity https://www.udemy.com/course/python-programming-for-cybersecurity-from-zero-to-defender/?kw=python+cyber&src=sac&couponCode=KEEPLEARNING https://w3.testout.com/	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Wireless Sensor Network Security			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	WISN 4202				
ECTS Credits	**6**				
SWL (hr/sem)5	150				
Module Level		UGIV	**Semester of Delivery**		Eight
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ass. Lec. Israa Majeed		**e-mail**	E-mail : israa.m.alobaidy@aliraqia.edu.iq	
Module Leader's Acad. Title		Ass.Lec.	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Networks Protocols security (NEPS 4101)	**Semester**	Seven
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course introduces students to the fundamentals of Wireless Sensor Network (WSN) security. It aims to: • Provide an overview of WSN architecture, components (including sensor nodes, communication interfaces, and sink nodes) and applications • Explore different types of network topologies and deployment strategies • Identify common security risks and attack types that target WSNs. • Introduce basic encryption, authentication, and key management techniques specifically designed for WSN environments. • Explain secure routing protocols and data protection mechanisms used in WSN communication.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module Learning Outcomes (Aligned with Program Outcomes): By the end of this module, students will be able to: • Analyze major security threats in Wireless Sensor Networks and assess their impact on network performance. (Supports Outcome 2) • Design and implement secure routing protocols and lightweight cryptographic techniques suited for WSN constraints. (Supports Outcome 2) • Use simulation tools (e.g., Cooja, NS3, Wireshark) to evaluate the effectiveness of WSN security mechanisms. (Supports Outcome 3)
Indicative Contents المحتويات الإرشادية	*1. Introduction to Wireless Sensor Networks (WSNs)* • Definition and conceptual overview of WSNs • Core components: sensor nodes, transceivers, processors, power units • Key characteristics: scalability, self-organization, energy constraints • Applications in various domains: environmental monitoring, military surveillance, healthcare, industrial systems *2. WSN Architectures and Network Topologies* • Network structures: Star, Mesh, Tree, Cluster-based topologies • Communication paradigms: single-hop, multi-hop • Architectural impacts on performance, security, and energy efficiency *3. Security Requirements and Threat Models*

	• Fundamental requirements: confidentiality, integrity, authentication, availability • Common attack surfaces and threats: eavesdropping, spoofing, tampering, data dropping • Challenges in implementing security within constrained environments *4. Cryptographic Mechanisms in WSNs* • Symmetric encryption (e.g., AES, RC5) • Asymmetric encryption (e.g., ECC, RSA) • Trade-offs between security strength and resource consumption *5. Key Management Techniques* • Pre-distribution schemes and random key assignment • Pairwise key establishment protocols • Dynamic key renewal and group key management *6. Secure Routing Protocols* • Overview of routing in WSNs • Secure protocols: SPINS, μTESLA, LEACH • Routing attacks: sinkhole, wormhole, Sybil, hello flood *7. Intrusion Detection Systems (IDS) in WSNs* • IDS types: signature-based, anomaly-based, hybrid • Centralized vs. distributed IDS architectures • Challenges in reducing false alarms and conserving power *8. Privacy Preservation in WSNs* • Techniques for source-location privacy • Dummy traffic generation and data obfuscation • Countermeasures to traffic pattern analysis *9. Trust and Reputation-Based Security Models* • Direct and indirect trust evaluation • Reputation propagation and trust scoring algorithms • Role of trust in secure communication and routing *10. Secure Data Aggregation* • In-network data aggregation models • Homomorphic encryption techniques • Ensuring end-to-end data integrity and confidentiality *11. Simulation Tools and Performance Evaluation* • Tools: Cooja (Contiki OS), NS3, Wireshark • Performance metrics: latency, packet delivery ratio, energy consumption • Simulating attacks and evaluating defense mechanisms *12. Mini-Project Development* • Scenario-based security design and implementation • Selection of attack or defense case study • Simulation, results analysis, and technical report writing
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:** 1. **Lectures and Interactive Discussions:** Weekly theoretical lectures supplemented with multimedia content (e.g., slides, videos, animations). 2. **Hands-on Simulation Labs:** Application of theoretical concepts through simulation using tools like **Cooja**, **NS3**, or **Wireshark**. 3. **Group Work and Mini-Projects:** Students work in small groups to solve problems or simulate attacks, each group presents their project results at the end of the semester 4. **Assignments and Quizzes:** Short homework tasks to check understanding and Periodic quizzes to review important points from lectures. 5. **Use of Visual Aids and Online Resources:** Videos, diagrams, and websites to help students understand abstract security concepts, and encouraging self-learning using reliable online materials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to WSN: architecture, challenges, and applications
Week 2	WSN components and network topologies
Week 3	Security requirements and threat models
Week 4	Lightweight cryptography mechanisms in WSN
Week 5	Key management and distribution schemes,
Week 6	Secure routing protocols (SPINS, LEACH)
Week 7	Midterm exam + project guidance
Week 8	Authentication and access control models
Week 9	Intrusion Detection Systems in WSN
Week 10	Privacy Preservation and Anti-Traffic Analysis
Week 11	Secure Data Aggregation and Integrity Checking
Week 12	Trust and Reputation Models in Sensor Networks
Week 13	Evaluation of Secure WSN Architectures
Week 14	Project presentations and peer feedback
Week 15	Final revision and Q&A session
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• **Karl, H., & Willig, A. (2005).** *Protocols and Architectures for Wireless Sensor Networks*. Wiley. (This textbook provides a comprehensive overview of WSN architecture, communication protocols, and resource constraints. It is essential for understanding the underlying structure of secure WSNs. • **Raghavendra, C. S., Sivalingam, K. M., & Znati, T. F. (2004).** *Wireless Sensor Networks*. Springer. (A foundational reference that explores WSN applications, energy efficiency, and design principles in various network scenarios.) • **Perrig, A., Szewczyk, R., Wen, V., Culler, D., & Tygar, J. D. (2002).** *SPINS: Security Protocols for Sensor Networks*, Wireless Networks. (A key academic paper introducing lightweight and efficient security mechanisms tailored to sensor networks, specifically SPINS and µTESLA.)	
Recommended Texts	J. López and J. Zhou, Eds., *Wireless Sensor Network Security*. Amsterdam: IOS Press, 2008.	
Websites	• **Contiki-NG OS Documentation** URL: https://contiki-ng.org (An open-source operating system tailored for WSN simulation, often used in lab experiments and secure protocol testing.) • **NS-3 Network Simulator Manual** URL: https://www.nsnam.org (A powerful discrete-event network simulator for modeling internet systems, including WSN routing and security behavior.) • **Wireshark User Guide** URL: https://www.wireshark.org (A widely-used tool for capturing and analyzing network packets, essential for inspecting communication and diagnosing security issues.)	

Grading Scheme

مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title				**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CRNS 3202				
ECTS Credits	6				
SWL (hr/sem)	**79**				
Module Level	UGIII		**Semester of Delivery**	6	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Asst. Prof. Dr. Ahmed Younus Yousuf		**e-mail**	ahmedyounusyousuf@aliraqia.edu.iq	
Module Leader's Acad. Title	Asst. Prof. Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Prof. Dr. Tayseer Salman		**e-mail**	tayseer.salman@aliraqia.edu.iq	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	DISP 3104	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Master cryptographic primitives (symmetric/asymmetric ciphers, hashes) and their mathematical underpinnings. 2. Analyze vulnerabilities in cryptographic implementations and network protocols. 3. Design secure systems using industry-standard tools (OpenSSL, Wireshark, Python). 4. Evaluate real-world threats (MITM, DoS, spoofing) and mitigation strategies (firewalls, IDS/IPS).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain core cryptographic concepts: primes, modular arithmetic, Feistel networks, and public-key infrastructure. 2. Contrast symmetric (DES, RC4) and asymmetric (RSA) algorithms. 3. Identify network threats (eavesdropping, DoS) and defenses (firewalls, IDS). 4. Evaluate security trade-offs in block vs. stream ciphers. 5. Assess hash function collision resistance (SHA-256 vs. MD5). 6. Implement RSA/Diffie-Hellman in Python/OpenSSL.
Indicative Contents المحتويات الإرشادية	1. Crypto Math I: Primes, GCD, LCM; Euclidean algorithm 2. Crypto Math II: Fermat's Little Theorem, IFP/DLP 3. Symmetric Ciphers: Substitution Techniques (Caesar, Affine, Vigenère), Transposition Techniques (Rail fence, Columnar) 4. Block Ciphers: Feistel network, DES 5. Stream Ciphers: RC4, LFSRs 6. Public Key Crypto I: RSA keygen, encryption, signatures 7. Public Key Crypto II: Diffie-Hellman, man-in-the-middle attacks 8. Hash Functions & Auth: SHA-256, HMAC 9. Network Threats: Eavesdropping, spoofing, DoS, MitM 10. Network Defences: Firewalls (packet/stateful), IDS/IPS

	11. Network Defenses: Firewalls (packet/stateful), IDS/IPS (continue)

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	**1. Structured Lectures:** Present information in an organized format, using clear explanations, illustrative examples, and visual aids to support understanding and retention. **2. Interactive Class Discussions:** Encourage student involvement through guided discussions that pose straightforward questions and relate concepts to real-life situations, fostering a collaborative learning environment. **3. Regular Quizzes and Review Sessions:** Conduct brief interactive quizzes and review activities each week to reinforce material covered in class and gauge student comprehension effectively. **4. Collaborative Mini Projects:** Engage students in group-based mini assignments that promote collaboration and allow them to practically apply the concepts learned in class. **5. Use of Visual Tools and Demonstrations:** Enhance learning through the integration of visual tools such as videos, infographics, and diagrams, which help clarify complex ideas and facilitate better understanding. **6. Hands-On Laboratory Activities:** Implement laboratory experiments as a key teaching strategy, enabling students to gain practical skills and firsthand experience. This approach encourages exploration, critical thinking, and application of theoretical concepts in a tangible setting.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3, 4 and 5
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 3,4 and 5
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 2, 3,4 and 5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3,4 and 5
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Crypto Math I**: Primes, GCD, LCM; Euclidean algorithm
Week 2	**Crypto Math II**: Fermat's Little Theorem, IFP/DLP
Week 3	Symmetric Ciphers: Substitution Techniques (Caesar, Affine, Vigenère), Transposition Techniques (Rail fence, Columnar)
Week 4	**Block Ciphers**: Feistel network, DES
Week 5	**Block Ciphers**: Feistel network, DES (continue)
Week 6	**Stream Ciphers**: RC4, LFSRs

Week 7	**Stream Ciphers**: RC4, LFSRs(continue)
Week 8	**Midterm Exam**
Week 9	**Public Key Crypto I**: RSA keygen, encryption, signatures
Week 10	**Public Key Crypto II**: Diffie-Hellman, man-in-the-middle attacks
Week 11	**Hash Functions & Auth**: SHA-256, HMAC
Week 12	**Hash Functions & Auth**: SHA-256, HMAC (continue)
Week 13	**Network Threats**: Eavesdropping, spoofing, DoS, MitM
Week 14	**Network Defenses**: Firewalls (packet/stateful), IDS/IPS
Week 15	**Network Defenses**: Firewalls (packet/stateful), IDS/IPS (continue)
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Prime factorization/GCD calculator
Week 2	Substitution Techniques encryption/decryption
Week 3	Transposition Techniques encryption/decryption
Week 4	DES encryption/decryption
Week 5	RC4 keystream reuse attack
Week 6	RSA key generation & message signing
Week 7	Simulate Diffie-Hellman MITM attack
Week 8	Compute SHA-256 collisions

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	William Stallings, *Cryptography and Network Security: Principles and Practice*, 8th ed. (Hoboken, NJ: Pearson, 2020)	Yes
Recommended Texts	**Kaufman, Perlman, & Speciner** *Network Security: Private Communication in a Public World* 3rd ed., Pearson, 2022.	Yes
Websites	1. **Cryptography I** (Coursera): coursera.org/learn/crypto 2. **PyCryptodome Documentation:** pycryptodome.org 3. **Wireshark Labs:** wireshark.org/#learnWS 4. **NIST Cybersecurity Framework:** nist.gov/cyberframework	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the

automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Cybersecurity management: compliance and convenience			**Module Delivery**	
Module Type	B			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYMA 3105				
ECTS Credits	7				
SWL (hr/sem)	94				
Module Level		UGIII	**Semester of Delivery**		five
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Prof. Dr. Tayseer S. Atia		**e-mail**	Tayseer.salman@aliraqia.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name		Asst. Prof. Ahmed Y. Yousuf	**e-mail**	ahmedyounusyousuf@aliraqia.edu.iq	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Establish Foundational Knowledge of cybersecurity governance, risk, and compliance (GRC) principles. 2. Develop Critical Thinking for analyzing security risks and designing compliance strategies aligned with business objectives. 3. develop Strategic Decision-Making skills for risk treatment and control implementation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain core cybersecurity governance models (NIST, ISO) and regulatory requirements (GDPR, PCI-DSS). 2. Classify risk types (inherent/residual, qualitative/quantitative) and analysis methodologies (FAIR, STRIDE). 3. Assess risk exposure using threat modeling and scenario analysis. 4. Design risk treatment strategies (mitigate/transfer/accept) based on cost-benefit analysis. 5. Map compliance frameworks (NIST CSF, ISO 27001) to organizational policies. 6. Evaluate incident response lifecycle phases and business continuity principles. 7. Critique audit methodologies for technical/administrative controls. 8. Synthesize converged security architectures (IT-OT-physical).
Indicative Contents المحتويات الإرشادية	**1. Introduction to Cybersecurity Management** • Governance vs. operational management • CIA triad in business contexts • Regulatory drivers: GDPR, HIPAA, PCI-DSS

	2. Risk Analysis • **Risk Typology:** o Inherent vs. residual risk o Qualitative (likelihood/impact scales) vs. quantitative (SLE/ALE) • **Techniques:** o FAIR model: Threat frequency, vulnerability, loss magnitude o STRIDE/DREAD threat modeling o Attack tree construction **3. Risk Management** • **Risk Treatment Framework:** o Avoidance, Mitigation (technical/administrative controls), Transfer (cyber insurance), Acceptance • **Implementation Lifecycle:** o NIST RMF (7 steps) o ISO 27005 risk monitoring • **Decision Metrics:** o Cost of controls vs. risk reduction o Risk appetite statements **4. Compliance Frameworks I (NIST)** • NIST CSF: Identify-Protect-Detect-Respond-Recover • SP 800-53 control families (AC, AU, CM) • System Security Plans (SSPs) **5. Compliance Frameworks II (ISO & Industry)** • ISO 27001: Annex A controls • PCI-DSS requirements (network segmentation, encryption) • SOC 2 Trust Principles **6. Policy Design & Lifecycle** • Policy hierarchy: Standards → Procedures → Guidelines • Access control models: RBAC, ABAC • Policy enforcement challenges (BYOD, shadow IT) **7. Security Auditing I** • Audit types (internal/external, compliance/operational) • Evidence collection standards • Sampling techniques (random, stratified) **8. Security Auditing II**

	• Vulnerability assessment vs. penetration testing • Configuration review benchmarks (CIS, DISA STIGs) • CVSS scoring interpretation **9. Incident Response & BC/DR** • IR lifecycle (NIST SP 800-61) • RTO/RPO metrics in disaster recovery • Tabletop exercise design **10. Security Convergence** • IT/OT security integration challenges • Physical-logical control alignment (badge access + NAC) • IoT/OT threat landscapes
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Structured Lectures: Present information in an organized format, using clear explanations, illustrative examples. 2. Interactive Class Discussions: Encourage student involvement through guided discussions that pose straightforward questions and relate concepts to real-life situations, fostering a collaborative learning environment. 3. Regular Quizzes and Review Sessions: Conduct brief interactive quizzes and review activities each week to reinforce material covered in class and gauge student comprehension effectively. 4. Collaborative Mini Projects: Engage students in group-based mini assignments that promote collaboration and allow them to practically apply the concepts learned in class. 5. Use of Visual Tools and Demonstrations: Enhance learning through the integration of visual tools such as videos, infographics, and diagrams, which help clarify complex ideas and facilitate better understanding. 6. Hands-On Laboratory Activities: Implement laboratory experiments as a key teaching strategy, enabling students to gain practical skills and firsthand experience.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3,4 and 5
	Assignments	2	10% (10)	4, 10	LO # 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 5, 6 ,7and 8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 5
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Cybersecurity Management • Governance vs. operational management • CIA triad in business contexts • Regulatory drivers: GDPR, HIPAA, PCI-DSS
Week 2-4	Week 2: Risk Analysis • Risk Typology: o Inherent vs. residual risk o Qualitative (likelihood/impact scales) vs. quantitative (SLE/ALE) • Techniques: o FAIR model: Threat frequency, vulnerability, loss magnitude o STRIDE/DREAD threat modeling o Attack tree construction
Week 5-7	Risk Management • Risk Treatment Framework: o Avoidance, Mitigation (technical/administrative controls), Transfer (cyber insurance), Acceptance • Implementation Lifecycle: o NIST RMF (7 steps) o ISO 27005 risk monitoring • Decision Metrics: o Cost of controls vs. risk reduction o Risk appetite statements
Week 8	Mid Term Exam
Week 9-10	Compliance Frameworks I (NIST)

	• NIST CSF: Identify-Protect-Detect-Respond-Recover • SP 800-53 control families (AC, AU, CM) • System Security Plans (SSPs)
Week 11	Compliance Frameworks II (ISO & Industry) • ISO 27001: Annex A controls • PCI-DSS requirements (network segmentation, encryption) • SOC 2 Trust Principles
Week 12	Policy Design & Lifecycle • Policy hierarchy: Standards, Procedures, Guidelines • Access control models: RBAC, ABAC • Policy enforcement challenges (BYOD, shadow IT)
Week 13	Security Auditing II • Vulnerability assessment vs. penetration testing • Configuration review benchmarks (CIS, DISA STIGs) • CVSS scoring interpretation
Week 14	Incident Response & BC/DR • IR lifecycle (NIST SP 800-61) • RTO/RPO metrics in disaster recovery • Tabletop exercise design
Week 15	Security Convergence • IT/OT security integration challenges • Physical-logical control alignment (e.g., badge access + NAC) • IoT/OT threat landscapes
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	• PII Scanner using Python regex
Week 2	• Quantitative Risk Calculator
Week 3	• Risk Register with Treatment Options
Week 4	• Control effectiveness scoring with pandas
Week 5	• Automated control gap analysis
Week 6	• Framework cross-mapping with Python dictionaries
Week 7	• Automated policy template generation • Log analysis with Python (Pandas for failed login stats) • Automated vulnerability scanning with python-nmap
Week 8	• IR playbook generator • Anomaly detection via access log correlation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**1.** Blum, D. (2020), p*ractical Cybersecurity Management: A Guide for Tomorrow's Security Leaders*. A press, ISBN: 978-1-4842-7165-7 (print), 978-1-4842-7166-4 (eBook) **2.** Joint Task Force (2018), *NIST Cybersecurity Framework (CSF) Version 1.1*. National Institute of	No

	Standards and Technology.	
Recommended Texts	1. Calder, A. (2020), ISO 27001/ISO 27002: A Pocket Guide (7th ed.), IT Governance Publishing, ISBN: 978-1787781654 2. Jones, J. & Ashenden, D. (2020), *Threat Modeling: Designing for Security*. Wiley, ISBN: 978-1118809990	No
Websites	1. NIST Computer Security Resource Center /csrc.nist.gov 2. ISO 27001 Official Portal/ iso.org/isoiec-27001 3. PCI Security Standards Council/pcisecuritystandards.org 4. MITRE ATT&CK Framework/attack.mitre.org 5. CIS Benchmarks cisecurity.org/benchmarks 6. FAIR Institute/fairinstitute.org	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Network Protocols Security**			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NEPS 4101				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ass.Prof. Dr.Satea Hikmat alnajjar Ass.Prof. Dr. Ali Salem Ali		**e-mail**	E-mail : dr.satea@gmail.com E-mail :alialbander2004@gmail.com	
Module Leader's Acad. Title		Ass.Prof. Dr	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name		Ass.Prof. Dr. Ali Salem Ali	**e-mail**	E-mail :alialbander2004@gmail.com	
Scientific Committee Approval Date		01/06/2025	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• To allow access to network resources • To translate, encrypt and compress data • To establish, manage, and terminate the session • The transport layer builds on the network layer to provide data transport from a process on a source machine to a process on a destination machine • To provide internetworking, to move packets from source to destination • To organize bits into frames, to provide hop-to-hop delivery
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand and describe the layered protocol model. • Conceptual, implementation aspects of network application protocols, furthermore examining popular application-level protocols • Students will demonstrate an understanding of network architecture, both hardware and software. • Design, analyse, and evaluate networks and services for homes, client/server, LANs and WANs. • Describe, analyse and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research. • Once the basic concepts of protocol working behavior are understood, the student takes part in hands-on projects to demonstrate the ability of the knowledge gained from the course.

Indicative Contents المحتويات الإرشادية	1. **Introduction to Cybersecurity** • Importance of cybersecurity • Key terms and definitions • Career paths and industry demand 2. **Understanding Threats, Attacks, and Vulnerabilities** • Types of cyber threats (malware, phishing, social engineering, etc.) • Vulnerability types and risk factors • Cyberattack lifecycle 3. **Cybersecurity Terminology and Models** • CIA triad (Confidentiality, Integrity, Availability) • Authentication, authorization, and accounting • Security models and policies 4. **Cryptography Fundamentals** • Encryption and decryption concepts • Symmetric vs. asymmetric encryption • Hashing and digital signatures 5. **Network Security Basics** • Firewalls, intrusion detection/prevention systems (IDS/IPS) • VPNs and secure communication • Network segmentation and defense-in-depth 6. **Endpoint and Application Security** • Antivirus, anti-malware, and endpoint protection • Secure coding principles and application vulnerabilities • Patching and configuration management 7. **Cloud Security Essentials** • Cloud deployment models (IaaS, PaaS, SaaS) • Cloud risks and security controls • Shared responsibility model

8. **Security Operations and Monitoring**

    - Security operations centres (SOC)
    - Log analysis and monitoring tools
    - Incident detection and alerting

9. **Cybersecurity Governance and Risk Management**

    - Policies, procedures, and compliance
    - Risk assessment and management frameworks
    - Business continuity and disaster recovery

10. **Cybersecurity Laws and Ethics**

    - Legal frameworks and global standards
    - Ethical hacking vs. criminal hacking
    - Data protection laws (e.g., GDPR, local regulations)

11. **Cybersecurity Certifications and Careers**

    - Overview of certifications (Security+, CEH, CISSP, etc.)
    - Roles in cybersecurity (analyst, engineer, CISO, etc.)
    - Skills development and lifelong learning

12. **Emerging Trends in Cybersecurity**

    - AI and machine learning in security
    - Zero Trust architecture
    - Cybersecurity in IoT and mobile devices

13. **Security Awareness and Best Practices**

    - Strong passwords, safe browsing, email hygiene
    - Social engineering prevention
    - Personal and organizational security hygiene

14. **Case Studies and Real-World Scenarios**

    - Review of major cyberattacks (e.g., Equifax, SolarWinds)
    - Lessons learned and risk mitigation strategies
    - Group discussion and presentations

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:** 1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	What Is a Protocol, What Is the Internet? ,A Nuts-and-Bolts Description ,A Services Description , Network Edge, handshaking protocol.
Week 2	Protocol Layers and Their Service Models, layered Architecture, Encapsulation.
Week 3	Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet.
Week 4	**Application-Layer Protocols.** The Web and HTTP, Overview of HTTP, Non-Persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET.
Week 5	File Transfer: FTP, FTP Commands and Replies, Electronic Mail in the Internet SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols

Week 6	Socket Programming: Creating Network Applications, Socket Programming with UDP , Socket Programming with TCP.
Week 7	Overview of How DNS Works, DNS Records and Messages. Homework Problems and Questions, Socket Programming Assignments, Wireshark Labs: HTTP, DNS.
Week 8	**Midterm Exam**
Week 9	**Transport-Layer Protocols.** Relationship Between Transport and Network Layers, Connectionless Transport: UDP, Segment Structure, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol.
Week 10	**Pipelined Reliable Data Transfer Protocols**, Go-Back-N (GBN) , Selective Repeat (SR), Connection-Oriented Transport: TCP , The TCP Connection ,TCP Segment Structure ,Round-Trip Time Estimation and Timeout , Reliable Data Transfer , Flow Control , Principles of Congestion Control, TCP Congestion Control. *Homework Problems and Questions ,Wireshark Labs: TCP, UDP*
Week 11	**Network -Layer Protocols.** Forwarding and Routing , Network Service Models ,Virtual Circuit and Datagram Networks , Virtual-Circuit Networks , Datagram Networks , Origins of VC and Datagram Networks, What's Inside a Router, The Internet Protocol (IP): Forwarding and Addressing in the Internet ,Datagram Format. *[Homework Problems and Questions ,Wireshark Labs*]
Week 12	**Link Layer and Modern LAN Technologies** Introduction to Link Layer, Advanced Ethernet Technologies (Ethernet over Fiber, PoE),Wireless LAN Protocols (IEEE 802.11ax, 802.11be),Data Link Layer Security (MACsec),ARP poisoning and defense mechanisms
Week 13	**Security Protocols in Networking** SSL and TLS,HTTPS,VPN Protocols (IPsec, OpenVPN), SSH vs Telnet, Zero Trust

	Networking
Week 14	**Modern Transport and Application Protocols** QUIC Protocol, SCTP, Web RTC , RTP/RTCP
Week 15	**Routing & SDN (Software-Defined Networking)** OSPF and BGP Deep Dive, SDN concepts,NFV,IPv6 Transition Mechanisms
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*A Top-Down Approach.*, this reference has been adopted for use at many hundreds of colleges and universities, translated into 14 languages, and used by over one hundred thousand students and practitioners worldwide. And it has been adopted as a source,IEEE 802.11 Working Group documentation, "Network Security Essentials" by William Stallings,RFC 5246 (TLS 1.2), RFC 8446 (TLS 1.3), IETF RFC 9000 (QUIC), RFC 4960 (SCTP)High Performance Browser Networking" by Ilya Grigorik	Yes
Recommended Texts	SDN: Software Defined Networks" by Thomas D. Nadeau and Ken Gray,Cisco SDN and SD-WAN documentation,"IoT Fundamentals" by David Hanes,ETSI & 3GPP 5G Protocol ArchitectureAnsible Networking Guide (RedHat)	Yes
Websites	https://gaia.cs.umass.edu/kurose_ross/online_lectures.htm https://ftp.simlab-soft.com/libweb/9946470/WilliamStallingsNetworkSecurityEssentialsPpt.pdf	

Grading Scheme مخطط الدرجات				
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Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Network Security**			**Module Delivery**	
Module Type	C			☒ **Theory**	
Module Code	NESE4203			☐ **Lecture**	
ECTS Credits	6.00			☐ **Lab**	
SWL (hr/sem)	**100**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGII		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ass.Prof. Dr.Satea Hikmat alnajjar Ass.Prof. Dr. Ali Salem Ali		**e-mail**	E-mail : dr.satea@gmail.com E-mail :alialbander2004@gmail.com	
Module Leader's Acad. Title	Professor Dr.		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Ass.Prof. Dr. Ali Salem Ali		**e-mail**	E-mail :alialbander2004@gmail.com	
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• **Introduce Fundamental Concepts** To provide a solid understanding of core principles in network security, including confidentiality, integrity, availability, authentication, and non-repudiation. • **Explore Common Threats and Attacks** To examine various types of network threats and vulnerabilities such as malware, phishing, denial of service (DoS), and man-in-the-middle attacks. • **Study Security Technologies and Protocols** To explain and evaluate the use of key technologies and protocols like firewalls, intrusion detection/prevention systems (IDS/IPS), VPNs, SSL/TLS, and IPsec. • **Apply Cryptographic Principles** To explore the role of cryptography in securing network communications, covering symmetric and asymmetric encryption, digital signatures, and certificates. • **Develop Practical Security Skills** To equip students with hands-on skills in securing networks through practical labs involving configuration of routers, switches, firewalls, and security tools (e.g., Wireshark, nmap, Snort). • **Understand Network Security Policies and Frameworks** To introduce legal, ethical, and organizational considerations in network security, including security policies, standards (e.g., ISO/IEC 27001), and risk

	management. • **Promote Critical Thinking and Problem Solving** To enhance analytical skills in identifying and responding to security incidents and designing secure network architectures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Outcome 1** Understand and describe the Availability Network Security Mode. **Outcome 2** Students will demonstrate an understanding of the usability, reliability, integrity, and safety of networks and data. **Outcome 3** Students learn basic principles of How Can Network Security Be Achieved and Cryptographic Techniques. **Outcome 4** Students be able to examine how to secure email how to secure a TCP connection, how to provide blanket security at the network layer, and how to secure a wireless LAN. **Outcome 5** Protecting organizational networks from attacks and how firewalls and intrusion detection systems work, these can enhance the basic concepts for the student in organizational networks security **Outcome 6** Concepts and topics included in the course, the student will be able to develop his skills in the future in the field of network security.
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning and Teaching Strategies:**

	1. **Lecture-Based Teaching:** Clear, structured delivery with examples and visual aids**.** 2. **Guided Class Discussions:** Simple questions and real-world scenarios to encourage engagement**.** 3. **Weekly Quizzes and Recap Activities:** Short interactive quizzes to reinforce learning**.** 4. **Group-Based Mini Assignments:** Basic collaborative tasks to apply concepts. 5. **Visual Aids and Demonstrations:** Use of videos, infographics, and simple diagrams to explain key ideas.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO # 1, 2, 3 and 4
	Assignments	2	10% (10)	4, 10	LO # 1, 2, 4, 6 and 7
	Projects	1	10% (10)	13	All
	Report	1	10% (10)	11	LO # 1, 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1, 2, 3, 4 and 6
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction Network Security, Access and Availability Network Security Mode.
Week 2	Malware, Short for malicious software, Types of Malware, Types of viruses, Trojan Horses, Spyware, Spam, Adware, Anti-Malware Program.
Week 3	How Can Network Security Be Achieved? Types of Spoofing Attacks, Confidentiality, End-Point Authentication, Operational Security.
Week 4	The Language of Cryptography, Cryptographic Techniques Cryptographic, Symmetric Key Cryptography Cipher-Block Chaining.
Week 5	Public Key Encryption, Public Key Encryption Algorithms
Week 6	The RSA algorithm (Rivest-Shamir-Adleman) , Session Keys, Why Does RSA Work?
Week 7	Message Integrity And Digital Signatures, Cryptographic Hash Functions, Message Authentication Code, Digital Signatures, Public Key Certification.
Week 8	**Midterm Exam**
Week 9	Authentication Mechanisms, Authentication Protocol *Ap1.0*, *Ap2.0*, *Ap3.0*, *Ap3.1*, *Ap4.0*, Ap5.0,

	Secure Shell(SSH).
Week 10	Securing E-Mail, Hash Functions And Digital Signatures.
Week 11	TLS 1.3 and Modern Secure Communication: HTTPS, QUIC, Forward Secrecy
Week 12	Zero Trust Architecture and Modern VPN Alternatives: ZTNA, SASE, Software-Defined Perimeter
Week 13	Multi-Factor Authentication and OAuth 2.0 / OpenID Connect: Identity Federation & Web Auth
Week 14	Securing IoT and Wireless Networks: IEEE 802.11i, IoT Threat Models, Device Hardening.
Week 15	Advanced Threats and Security Monitoring: APTs, SIEM, Threat Hunting using MITRE ATT&CK
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Kurose, James F., and Keith W. Ross. *Computer Networking: A Top-Down Approach*. 6th ed. 2. Cisco Systems, Inc. *Network Security ISOC NTW* © 2000. 3. NIST Special Publication 800-207, *Zero Trust Architecture*. 4. RFC 8446: *The Transport Layer Security (TLS) Protocol Version 1.3*. 5. OWASP IoT Project: https://owasp.org/www-project-internet-of-things/	Yes
Recommended Texts	1. *Computer networking: a top-down approach / / James F. Kurose, Keith W. Ross.—6th.* 2. Network Security ISOC NTW © 2000, Cisco Systems, Inc.	Yes

Websites	OWASP IoT Project: https://owasp.org/www-project-internet-of-things/ MITRE ATT&CK Framework: https://attack.mitre.org/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**OPERATING SYSTEMS AND NETWORKS**			**Module Delivery**	
Module Type	**Basic**			☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	OPSA 2206				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGII		**Semester of Delivery**	FOUR	
Administering Department	NETWORK ENGINEERING DEPARTMENT		**College**	COLLAGE OF ENGINEERING	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	At the end of this course, the learner should be able to: 1. provide users with a convenient interface to use the computer system. 2. act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources. 3. manage the resources of a computer system. 4. To make the computer system convenient to use in an efficient manner. 5. hide the details of the hardware resources from the users. 6. provide users with a convenient interface to use the computer system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Understanding Operating System Concepts:** • Gain a solid understanding of operating system fundamentals, including process management, memory management, file systems, and device management. • Learn about the different types of operating systems, their characteristics, and their role in managing computer resources . **2. Windows Operating System:** • Acquire comprehensive knowledge of the Windows operating system architecture, features, and functionalities. • Learn to navigate and configure the Windows user interface and manage system settings. • Develop skills in installing, configuring, and maintaining Windows operating systems. • Gain proficiency in managing user accounts, file systems, and security settings in Windows. • Learn to troubleshoot common issues and perform system optimizations in Windows. **3. Linux Operating System:** • Understand the Linux operating system structure, including the kernel, shell, and file system.

	• Gain practical experience with Linux distributions (e.g., Ubuntu, CentOS) and their installation and configuration. • Learn command-line operations and common Linux utilities for system administration tasks. • Develop skills in managing user accounts, permissions, and file systems in Linux. • Explore Linux networking, security, and shell scripting. **4. Operating System Administration:** • Learn the principles of operating system administration, including system monitoring, performance optimization, and troubleshooting techniques. • Understand the concepts of system backup and recovery, software installation, and updates. • Gain knowledge of system security practices, including user authentication, access control, and auditing. **5. Application Software:** • Understand the role and functionality of various application software in an operating system environment. • Learn to install, configure, and manage common productivity tools such as office suites, web browsers, and email clients. • Develop skills in troubleshooting application issues and ensuring software compatibility.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Operating Systems:** • Definition and purpose of operating systems • Evolution of operating systems • Types of operating systems (batch, multi-programming, multi-tasking, real-time, etc.) 2. Windows Operating System: • Overview of Windows operating system versions (Windows 10, Windows Server) • Windows file system and directory structure • Windows user interface and customization options • Windows system administration and management tools • User account management and permissions in Windows • Windows networking and network services 3. Linux Operating System: • Introduction to Linux distributions (Ubuntu, CentOS, Fedora, etc.) • Linux file system hierarchy • Command-line operations and basic shell scripting • User and group management in Linux

	• Linux networking and network configuration • Linux security and access control 4. Process Management: • Process concepts and process states • Process scheduling algorithms • Process synchronization and inter-process communication • Process management in Windows and Linux 5. Memory Management: • Memory hierarchy and virtual memory • Memory allocation and deallocation techniques • Paging and segmentation • Memory management in Windows and Linux 6. File Systems: • File system organization and structure • File operations and file access methods • File system implementation and management • File system security and permissions in Windows and Linux 7. Device Management: • Device drivers and device management in Windows and Linux • Input/output operations and techniques • Disk management and storage technologies • Printers and printing management in Windows and Linux 8. Application Software: • Introduction to common application software (office suites, web browsers, email clients, etc.) • Installation and configuration of application software • Troubleshooting common application issues • Compatibility and interoperability of applications across operating systems

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lecturing offline mode, in class. 2. Flip class 3. Assignment, and quizzes. 4. Hands-on and interactive activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)		LO #1, #2 and #10, #11
	Assignments	2	10% (10)		LO #3, #4 and #6, #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction** 1. What is an Operating System? 2. Functions of Operating Systems 3. Operating System Types 4. Windows OS 5. Linux OS
Week 2	**OS structures** 1. Computer hardware properties 2. Disk subsystems

Week 3	**Virtual memory management** 1.Demand Paging (Advantages – Disadvantages) 2.Page Fault Service Time 3.Swapping 4.Thrashing 5.Performance in Virtual Memory 6.Frame Allocation 7. Paging Policies
Week 4	**CPU Scheduling algorithms** 1.First Come First Serve (FCFS) 2.Shortest Job Next (SJN) 3.Priority Based Scheduling 4.Shortest Remaining Time 5.Round Robin Scheduling 6.Multiple-Level Queues Scheduling
Week 5	**File systems** 1.Attributes 2.Types 3.Operations 4.FILE DIRECTORIES 5.SINGLE-LEVEL DIRECTORY 6.TWO-LEVEL DIRECTORY 7.TREE-STRUCTURED DIRECTORY 8.FILE ALLOCATION METHODS 9.Disk Free Space Management
Week 6	**Clouds & Virtualization** 1.The Cloud Concept 2.Virtualization
Week 7	**Disaster Recovery -DR** 1.Introduction 2.Disasters Types 3.Disaster Recovery Planning 4.Alternative Work Sites
Week 8	**Data Centers- DCs:** 1.Introduction 2.General Structure Of DC 3.Basis DCs Standards 4.Networking Structure 5.Cabling Structures in DCs
Week 9	**Process concept in moldering OS** 1.Need for Five-State Process Model 2.Execution of Process in Two-state Model 3.Possible State Transitions
Week 10	**Multi-processes** 1.Introduction 2.What is a Multiprocessing Operating System? 3.Types of Multiprocessing OS 4.Working of Operating System

	5.Multiprogramming and Multiprocessing Operating System
Week 11	**Process synchronization** 1.Critical section problem 2.Classical problem
Week 12	**Shell and Shell scripting** 1.Introduction Operating system shells 2.Types of Shells in Operating Systems 3.Shell Scripting
Week 13	**Concurrent programming.** 1.Introduction 2.Principles of Concurrency 3.Concurrency Mechanisms 4.Problems in Concurrency 5.Real-World Applications of Concurrency 6.Future Directions for Concurrency in Operating Systems
Week 14	**Secondary memory management and file systems** 1.What Is Secondary Storage Management 2.What Are Secondary Storage Devices In Operating System 3.What Is the Function of Secondary Storage Management? 4.The Different Storage Devices for Your Compute 5.Examples. 6.Secondary Storage Management in Android
Week 15	**Linux Kernel** 1.Define Linux Kernel 2.What is Linux Operating System and Kernel 3.Figure
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free.	Yes

Recommended Texts	Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commons BY-NC-SA	No
Websites	https://books.google.iq/books/about/Operating_Systems.html?id=0a-ouwEACAAJ&redir_esc=y	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
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