Ministry of Higher Education and Scientific Research,
Scientific Supervision and Scientific Evaluation Apparatus,
Directorate of Quality Assurance and Academic Accreditation
Department

Academic Program and Course Description Guide

2026 -2025

Introduction:

The educational program is a well—planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Academic Program Description Template

University Name: Tikrit University

College/Institute: College of Computer Science and Mathematics

Scientific Department: Cybersecurity Department **(established in the academic year 2024-2025).**

Academic or professional program name: Bachelor of Science in Cybersecurity

Final degree title: Bachelor of Science in Cybersecurity

Academic system: based-semester

- **Date of description issues** **1 / 3 / 2026**
- **Date the file was filled:** **1 / 3 / 2026**

Signature:

Scientific Assistant
Asst. Prof. Dr. Moceheb Lazam Shuwandy

Date: 10/3/2026

Signature:

Head of Department
Asst. Prof. Dr. Majid Hamed Ali

Date: 10/3/2026

- **The file was reviewed by : Quality Assurance and University Performance Division**
- **The Director of the Quality Assurance and University Performance Division Name: Asst. Prof. Dr. Ya'mar Abdul Latif Hussein**

Date: 10/3/2026

Signature:

Dean's approval

Asst. Prof. Dr. Mahmood N. Salih

Dean

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra—curricular activities to achieve the learning outcomes of the program.

1. Program Vision

To become a leading department in cybersecurity at the local, regional, and international levels, with a focus on excellence in teaching, learning, scientific research, and community service. The program aims to graduate professionals capable of addressing emerging cybersecurity challenges in the digital era.

2. Program Mission

The Bachelor of Science in Cybersecurity program aims to:

- Prepare qualified graduates equipped with theoretical knowledge and practical skills for securing systems, protecting networks, and managing cybersecurity risks effectively.
- Enable graduates to have a strong presence locally and internationally in the field of cybersecurity while encouraging continuous learning and skill development in line with technological advancements.
- Promote scientific research in cybersecurity through graduates capable of pursuing advanced studies and supporting innovation and creativity in compliance with global standards.
- Build effective partnerships with the community and various institutions through student projects, training programs, and consultations to raise awareness about cybersecurity and data protection in the digital age.

3. Program Objectives

The Cybersecurity Department aims to achieve the following objectives for students earning a Bachelor's degree in Cybersecurity. Upon graduation, students will be able to:

1. Acquire advanced theoretical knowledge and practical skills in cybersecurity, enabling them to protect systems and networks, secure information, and contribute to digital security at national and regional levels.
2. Be prepared to pursue advanced education and postgraduate studies in cybersecurity fields, equipping them to conduct research and develop innovative solutions for cybersecurity challenges.
3. Understand and adhere to professional ethical standards expected of cybersecurity specialists, while appreciating the social and ethical implications of security technologies and data protection.
4. Develop critical thinking and problem-solving skills to address complex issues in cybersecurity and recognize the importance of lifelong learning to stay abreast of rapid advancements in the field.

5. Work effectively as members of interdisciplinary teams and contribute to developing cybersecurity strategies in various institutions.
6. Establish professional partnerships with public and private sectors to foster innovation and implement security solutions that meet local and international market demands.
7. Enhance their ability to conduct security analyses and make informed decisions to protect systems from cyber threats using the latest technologies and tools in cybersecurity.

4. Program Accreditation

Accreditation Board for Engineering and Technology (ABET)

5. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews•
Institution Requirements				
College Requirements				

Department Requirements				
Summer Training				
Other				

This can include notes whether the course is basic or optional.

6. Program Description

Year / Semester	Module Code	Module Name	SSWL (hr/w)	
			CL (hr/w)	Pr (hr/w)
First Year / First Semester	TUCY101	Programming (1)	2	2
	TUCY102	Discrete Structures (1)	2	-
	TUCY103	Computer Organization	2	2
	TUCY104	Probability and Statistics	2	2
	TUCY105	Data Security Principles	2	2
	TUCY106	Mathematics	2	-
	UOT002	English Language	2	-
First Year / Second Semester	TUCY111	Advanced Programming (2)	2	2
	TUCY112	Basics of Logical Design	2	2
	TUCY113	Cybersecurity Fundamentals	2	2
	TUCY114	Discrete Structures (2)	2	-
	TUCY115	Coding and Information Theory	2	-
	UOT001	Arabic Language	2	-
	UOT003	Democracy and Human Rights	2	-
2nd Year / First Semester	UOT002	English Language2	2	-
	TUCY201	Object-Oriented Programming 1	2	2
	TUCY202	Data Structures	2	2
	TUCY203	Computational Theory	2	-
	TUCY204	Database Basics	2	2
	TUCY205	Cryptography (1)	2	2
2nd Year / First Semester	TUCY201	Object-Oriented Programming (2)	2	2
	TUCY202	Cyber Security tools	2	2
	TUCY203	Distributed Databases	2	2
	TUCY204	Software Security	2	2
	TUCY205	Cryptography (2)	2	2
	UOT005	Ba'ath crimes in Iraq	2	-
	UOT001	Arabic Language (2)	2	-

7. Expected learning outcomes of the program

Knowledge:

1. Equip students with the theoretical knowledge and practical skills needed to analyze cybersecurity problems and design appropriate solutions using best practices, enabling them to excel and secure prominent positions in the job market.
2. Enhance students' ability to innovate while adhering to professional, legal, and ethical standards and working effectively in multidisciplinary teams.
3. Enable students to pursue continuous self-learning to stay updated with advancements in cybersecurity technologies and adopt new techniques and methods.
4. Develop students' ability to analyze and discuss outcomes using the knowledge gained during their studies.
5. Increase students' research expertise, including verifying the validity of conclusions and findings.
6. Strengthen students' professional experience by applying the knowledge and skills acquired during their education.

Prepare students to enroll in postgraduate programs in cybersecurity and other related technical fields.

Skills:

1. Acquire essential skills in programming, encryption, and electronic security.
2. Develop the ability to conduct research addressing challenges and techniques in cybersecurity.

Ethics

1. Foster an understanding of cybersecurity principles and encourage teamwork and collaboration.
2. Instill ethical values in students, including loyalty, respect for rules, and adherence to administrative regulations.
3. Cultivate a spirit of initiative and positivity, enabling students to face future professional challenges.
4. Encourage participation in extracurricular, voluntary, and community activities

to strengthen their societal role.

5. Promote values of citizenship, national identity, and altruism as part of their professional and social responsibilities.

This vision reflects the department's commitment to producing graduates with the knowledge, skills, and values needed for success in the dynamic and technical work environment.

8. Teaching and Learning Strategies

1. **Theoretical and Practical Lectures:** Utilize methodological and supplementary textbooks alongside modern educational tools to deliver comprehensive and innovative academic content.
2. **Skill Development:** Provide students with foundational skills in computing and e-learning while employing advanced devices and technologies to enhance the learning process and technical proficiency.
3. **Encouraging Creativity in Graduation Projects:** Grant students the freedom to choose graduation research topics, allowing them to explore their intellectual potential and reveal their scientific interests and preferences, aligning with cybersecurity requirements.
4. **Promoting Interaction and Discussion:** Create a learning environment that allows students to share ideas during lectures, engage in discussions, exchange opinions, and develop data analysis skills while drawing scientific conclusions.

These strategies aim to prepare graduates with competency, innovation, and the ability to tackle challenges in the field of cybersecurity.

9. Evaluation methods

1. Electronic examinations.
2. Central and monthly examinations.
3. Daily quizzes.
4. Daily assignments.
5. Scientific reports.

6. Computer-based laboratory examinations.
7. Graduation projects.

10. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the Teaching staff	
	General	Special			Staff	Lecturer
Professor	Computer Science	Information Security			1	
Assistant Professor	Computer Engineering	Cybersecurity			1	
Assistant Professor	Computer Science	IoT Technologies			1	
Assistant Professor	Computer Science	Database Technology			1	
Assistant Professor	Computer Science	Informatics and Communications			1	
Assistant Professor	Computer Science	Software Engineering			1	
Assistant Professor	Computer Science	Mobile Security			1	
Assistant Professor	Computer Science	Cybersecurity			1	
Assistant Professor	Computer Science	Machine Learning and Data Mining			1	
Lecturer	Computer Science	Information Systems			1	
Lecturer	Computer Science	Software Engineering			1	
Lecturer	Computer Science	Information Technology			1	
Assistant Lecturer	Computer Science	Information Security			1	
Assistant Lecturer	Computer Science	Computer Security			2	

11. Acceptance Criterion

1. Central Admission:

Admission to the Cybersecurity Department is based on the central admission system of the Ministry of Higher Education and Scientific Research to ensure fair distribution among eligible students.

2. Admission Criteria:

Students are admitted based on their grades in the central admission lists. However, children of faculty members, martyrs, and those eligible for special privileges under ministry regulations are granted the right to choose their preferred department, ensuring their distribution aligns with departmental needs.

12. Program Development Plan

The Cybersecurity Department focuses on enhancing students' research and inquiry skills through various academic activities, including attending scientific discussions and preparing specialized research in cybersecurity. The department emphasizes developing students' abilities to analyze data, draw logical conclusions, and refine their critical thinking and argumentation skills.

To achieve this, students are encouraged to:

- Visit the library weekly to explore academic resources, books, and scientific journals as primary information sources.
- Utilize the internet, e-learning tools, electronic references, and specialized scientific websites in cybersecurity to deepen their knowledge and stay updated with technological advancements.
- These efforts aim to prepare students as distinguished researchers capable of contributing to the advancement of cybersecurity and addressing its future challenges.

Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First Year / First Semester	TUCY101	Programming (1)	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY102	Discrete Structures (1)	Core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY103	Computer Organization	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY104	Probability and Statistics	Core	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	TUCY105	Data Security Principles	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY106	Calculus	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOT002	English Language	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
First Year / Second Semester	TUCY111	Advanced Programming (Programming 2)	Core	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	TUCY112	Basics of Logical Design	Core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY113	Cybersecurity Principles	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY114	Discrete Structures (2)	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY115	Coding and Information Theory	Core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOT001	Arabic Language	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	UOT003	Democracy and Human Rights	Support	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Second Year / First Semester	UOT002	English Language2	Support	✓		✓	✓		✓	✓	✓		✓	✓	✓
	TUCY201	Object-Oriented Programming 1	Core	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
	TUCY202	Data Structures	Core	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

	TUCY203	Computational Theory	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY204	Database Basics	Basic	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
	TUCY205	Cryptography (1)	Core	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Second Year / First Semester	TUCY201	Object-Oriented Programming 2	Core	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY202	Cyber Security tools	Core	✓		✓	✓	✓	✓		✓	✓		✓	✓
	TUCY203	Distributed Databases	Basic	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	TUCY204	Software Security	Basic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	TUCY205	Cryptography (2)	Core		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	UOT005	Ba'ath crimes in Iraq	Support	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
	UOT001	Arabic Language (2)	Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*** The scientific department was introduced for the current academic year 2025-2026, so it was limited to the learning outcomes of the program for the Two Levels - the first and second semesters**

Academic program

Course System – Level 2 - 2025-2026

MODULE DESCRIPTION FORM

Module Information					
Module Title	**English Language (2)**			**Module Delivery**	
Module Type	**S**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYBS-206				
ECTS Credits	2				
SWL (hr/sem)	**50**				
Module Level		2nd level	**Semester of Delivery**		1
Administering Department		Cybersecurity Department.	**College**	CCMS	
Module Leader	Dr. Marwa Karem Ali		**e-mail**		
Module Leader's Acad. Title		Assistant Prof.	**Module Leader's Qualification**		PhD
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		18 / 9 /2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	7. To Develop English skills by listening and writing . 8. Learning English and conversation training 9. Conversations in English in the field of computers (Information Technology). 10. The student receives all the information about the computer and at the same time learns and trains the correct pronunciation in this language. 11. conversations between students about everything related to Information Technology.
Module Learning Outcomes	**Important:** Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 9. Learning English and conversation training. 10. Listening and writing in English language. 11. Basic information about Information Technology (IT). 12. Learns and trains the correct pronunciation in this language. 13. Learn and write common sentences in the English language. 14. Learn to write words that end or start with the same syllable in the English language. 15. Learn about job interviews. 16. Learn personal presentation in English language.
Indicative Contents	**<u>Unit 5:</u> E-commerce companies [8hrs]** E-commerce companies: listening, writing, reading, speaking and vocabulary. E-commerce features: listening, writing, language, speaking and vocabulary. Transaction security: listening, writing, language, speaking and vocabulary. Online transaction: listening, writing, language, speaking and vocabulary. **<u>Unit 6:</u> Network systems [8hrs]** Types of networks: describe networks and make recommendations. Networking hardware: listening, writing, language, speaking and vocabulary. Talking about the past: listening, writing, language, speaking and vocabulary. Network range and speed: listening, writing, language, speaking and vocabulary. **<u>Unit 7:</u> IT support [8hrs]** Fault diagnosis: talk about results of an action, language, speaking and vocabulary.

	Software repair**:** listening, writing, language, speaking and vocabulary. Hardware repair: listening, writing, language, speaking and vocabulary. Customer service: explain the use of things. listening, writing and vocabulary. **<u>Unit 8:</u> IT security and safety [8hrs]** Security solutions: listening, writing, language, speaking and vocabulary. Workstation health and safety: listening, writing, language, speaking and vocabulary. Security procedures: listening, writing, language, speaking and vocabulary. Reporting incidents: listening, writing, language, speaking and vocabulary.
Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in the delivery of this units are to encourage students to participate in writing and reading exercises, while improving their listening skills. This will be achieved through student interaction in class and completion of daily assignments (homework).

Student Workload (SWL)			
Structured SWL (h/sem)	32	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	18	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

		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	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)

	Material Covered
Week 1	E-commerce companies +listening, speaking and vocabulary. .
Week 2	E-commerce features + listening, writing, language and vocabulary.
Week 3	Transaction security + listening, writing, language and speaking.
Week 4	Online transaction + listening, writing, language, speaking and vocabulary
Week 5	Types of network /describe networks and make recommendations.
Week 6	Networking hardware + listening, writing, language, speaking and vocabulary.
Week 7	Talking about the past + listening, writing, language, speaking and vocabulary.
Week 8	Network range and speed + listening, writing, language, speaking and vocabulary.
Week 9	Fault diagnosis + talk about results of an action, language, speaking and vocabulary.
Week 10	Software repair **+** listening, writing, language, speaking and vocabulary.
Week 11	Hardware repair + listening, writing, language, speaking and vocabulary.
Week 12	Customer service/ explain the use of things + listening, writing and vocabulary.
Week 13	Security solutions: listening, writing, language, speaking and vocabulary.
Week 14	Workstation health and safety: listening, writing, language, speaking and vocabulary.
Week 15	Security procedures + Reporting incidents/ listening, writing, language, speaking and vocabulary.
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	

Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	English for information technology , 1 vocational English, course book, Maja Olejniczak, series editor David Bonamy.	Yes
Recommended Texts		
Websites	https://www.youtube.com/watch?v=WOVu22J_sN8	Book 1 Audio CD

Grading Scheme

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

MODULE DESCRIPTION FORM

Module Information

Module Title	**Cryptography (1)**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-205**		
ECTS Credits	**8**		
SWL (hr/sem)	**200**		
Module Level	2nd level	**Semester of Delivery**	1
Administering Department	Cybersecurity Depart.	**College**	CCMS
Module Leader	Dr. Maytham Mustafa Hammoud	**e-mail**	maythamhammood@tu.edu.iq
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	PhD
Module Tutor	Assistant Lecturer. Raghad AbdulRahmam Shaban Assistant Lecturer. Thulfiqar Muayad Hameedi	**e-mail**	rw@tu.edu.iq tholfkar.m.himedy@tu.edu.iq
Peer Reviewer Name	Dr. Moceheb Lazam Shuwandy	**e-mail**	moceheb@tu.edu.iq
Scientific Committee Approval Date	2025/9/1	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	Teaching students: 1- Learn about cryptography and related algorithms (old and new) 2- In addition to the mathematical principles of cryptography 3- Cryptography is the practice and study of techniques used to secure communication and protect information from unauthorized access or modification.
Module Learning Outcomes	After this course, you will be able to 1. The student knows the concepts of codes and ciphers and the objectives of data security 2. Teaching the student ancient and modern encryption algorithms, both symmetric and asymmetric 3. The ability to implement and program different methods and build new systems 4. Familiarize students with the basics of analyzing and breaking ciphers
Indicative Contents	**Confidentiality**: The primary objective of cryptography is to ensure the confidentiality of information. This means that only authorized individuals or entities should be able to access and understand the information. Cryptographic techniques such as encryption can transform data into an unreadable form, making it secure even if it falls into the wrong hands. [8 hrs] **Integrity**: Cryptography aims to maintain data integrity, ensuring it remains unchanged during storage or transmission. Cryptographic mechanisms such as digital signatures and hash functions can be used to verify data integrity, detecting unauthorized modifications or tampering.

	Authentication: Cryptography provides mechanisms for verifying the authenticity of data, messages, or participants in a communication. Through techniques such as digital certificates, public-key infrastructure (PKI), and digital signatures, cryptography can ensure that the sender and receiver of information can trust each other's identities and integrity. [8hrs] **Non-repudiation:** the property that prevents individuals from denying their involvement in a communication or transaction. Cryptographic techniques like digital signatures provide evidence of a message's origin, making it difficult for the sender to later deny having sent it. **Key Management**: Cryptography involves managing cryptographic keys, which are essential for encryption, decryption, and other cryptographic operations. Key management aims to ensure the secure generation and distribution. [8 hrs]

Learning and Teaching Strategies	
Strategies	Cryptography is the practice and study of techniques used to secure communication and protect information from unauthorized access or modification. The objectives of cryptography can vary depending on the specific context and goals.

Student Workload (SWL)			
Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	92	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Module Evaluation

		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)

	Material Covered
Week 1	Introduction, Terms and Basic Concepts
Week 2	Classical Encryption Techniques (Transposition) & (Substitution)
Week 3	Modern Encryption Techniques
Week 4	Symmetric Crypto Primitives
Week 5	Stream Ciphers
Week 6	Introduction to Number Theory
Week 7	Principles of Public key Cryptography and Cryptosystem
Week 8	Public key Cryptography and RSA
Week 9	The RSA algorithm
Week 10	Block Ciphers
Week 11	Data Encryption Standard, DES
Week 12	Authentication Messages and Requirements
Week 13	Hash Functions
Week 14	Digital Signature

Week 15	Review
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab1: The Programming Language is C#
Week 2	Lab2: Steps for an old methods
Week 3	Lab3: Steps for an some modern methods
Week 4	Lab4: Starts to work with Symmetric methods
Week 5	Lab5: Build programs for some stream cipher's methods
Week 6	Lab6: Build programs for some mathematical methods
Week 7	Lab7: Programming RSA method
Week 8	Lab8: Programming DES method
Week9	Lab9: Apply some methods for Authentication
Week10	Lab10: Apply some methods for Hash function
Week11	Lab11: Apply some methods for Digital signature

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	"Cryptography and Network Security: Principles and Practice" , (2nd Ed.), William Stallings, Prentice-Hall, Inc., 1999	Yes
Recommended Texts	"Cryptography and Network Security: Principles and Practice", (7th Ed.) , William Stallings , Prentice-Hall, Inc., 2016 "Computation, Cryptography, and Network Security" (1st ed.), Nicholas J. Daras & Michael Th. Rassias, Springer, 2015	Yes
Websites	https://blog.rsisecurity.com/what-is-cryptography-in-cyber-security/	

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

Module Information					
Module Title	**Database Basics**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-204**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2nd level	**Semester of Delivery**		1
Administering Department		Cybersecurity Department.	**College**		CCMS
Module Leader	Dr. Saadi Hamad Thalleg		**e-mail**		saadi.alluhaibi@tu.edu.iq
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		
Module Tutor	Assist Lect. Saba Alaa Abd Al-Wahab		**e-mail**		Saba.programmer12@tu.edu.iq
Peer Reviewer Name		Dr. Moceheb Lazam	**e-mail**		moceheb@tu.edu.iq
Scientific Committee Approval Date		9/1/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. To know the benefits of database systems. 2. To understand general database concepts. 3. To be able to analyze the business rules. 4. To know how to design database systems using E-R diagrams. 5. To understand all E-R diagrams concepts. 6. To implement database operations using SQL language
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Know the differences between file systems and database systems. 2. List the database systems' benefits. 3. Define all database basic concepts. 4. Understand the business rules and their role in database design. 5. Know E-R diagram concepts. 6. Define entity, attributes, and relationships. 7. Convert the business rule to an E-R diagram. 8. Understand supertype/subtype concepts. 9. Draw E-E-R diagrams.
Indicative Contents	When working with databases, having a clear strategy is crucial for ensuring efficiency, data integrity, and scalability.

Learning and Teaching Strategies

Strategies	

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**100**		

Module Evaluation

		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)

	Material Covered
Week 1	Basic Concepts and Definitions
Week 2	Traditional File Processing Systems
Week 3	The Database Approach
Week 4	Data Modeling
Week 5	Modeling Entities
Week 6	Modeling Attributes
Week 7	Modeling Relationships
Week 8	Degree of A Relationship
Week 9	Cardinality Constraints
Week 10	Other Subjects about Modeling Relationships
Week 11	The Enhanced E-R Model
Week 12	Representing Specialization and Generalization
Week 13	Specifying Constraints in Supertype/Subtype Relationships
Week 14	Defining Supertype/Subtype Hierarchies

Week 15	Case Study
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: Introduction to SQL
Week 2	Lab 2: Tables
Week 3	Lab 3: Data types
Week 4	Lab 4: Create tables
Week 5	Lab 5: Insert command
Week 6	Lab 6: Update command
Week 7	Lab 7: Delete and Drop command
Week 8	Lab 8: Examples
Week 9	Lab 9: Select command
Week 10	Lab 10: Select command with where
Week 11	Lab 11: Select command and IN, like
Week 12	Lab 12: Select command and Between.
Week 13	Lab 13: Type of join
Week 14	Lab 14: Inner join
Week 15	Lab 15: Left, right join

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Modern Database Management, Jeffrey A. Hoffer, Twelfth Edition	NO
	SQL complete references	
Recommended Texts		
Websites		

Grading Scheme

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

Module Information					
Module Title	**Computational Theory**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYBS-203				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		2nd level	**Semester of Delivery**		1
Administering Department		Cybersecurity Department.	**College**	CCSM	
Module Leader	Dr. Muhannad Diab Mahdi		**e-mail**	muhaned@tu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		
Module Tutor	م.م رنا نزهان هادي		**e-mail**	rhadi@tu.edu.iq	
Peer Reviewer Name		Dr. Moceheb Lazam Shuwandy	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date		18/9/2026	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. The theory of computability aims to teach the student to use algebraic laws. 2. Laws of algebra of propositions 3. In addition to the study of quantifiers 4. Study different groups, theories, and schemes, in addition to studying the type of grammar. 5. The study of DFA and NDFA 6. State deletion algorithms and many topics so that the student can solve issues related to computational theory with ease and clarity.
Module Learning Outcomes	1. In theoretical computer science and mathematics, computational theory is the branch that deals with the effectiveness of solving problems through a computational model using an algorithm. 2. We divide this field into three main sections: autonomy theory and languages, computational theory, and computational complexity theory. 3. Because it is easy to form, it can be analyzed and used to prove results. 4. Because it represents what many consider to be the most powerful 'logical' computational model possible. 5. The possibility of an infinite amount of memory seems to be an unattainable advantage, but any problem decided to be solved by means of a Turing machine will always require only a finite amount of memory. 6. So, in principle, any problem that can be solved by a Turing machine can therefore be solved by a computer with a limited amount of memory. 7. Computational theory can be considered the creation of models of all kinds in the field of computer science. Therefore, mathematics and logic are used.
Indicative Contents	The aim of the Theory of Computability is to teach the student to use algebraic laws in solving problems, in addition to studying quantifiers, studying groups, theories, and different schemes, in addition to studying the type of grammar, studying DFA and NDFA, state deletion algorithms, and many other topics, so that the student can solve problems related to theory. Calculation with ease and clarity.

Learning and Teaching Strategies

Strategies	Computability theory deals primarily with the question of the extent to which a problem is solvable on a computer. Computational theory relies primarily on results from the stopping problem. Computational theory in computer science studies the possibility of efficiently solving problems with a computer and what a computer can calculate today and what it might be able to calculate in the future.

Student Workload (SWL)

Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**75**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	
	Assignments	2	10% (10)	2 and 12	
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Theory of computability
Week 2	grammar
Week 3	Type of grammar
Week 4	Quiz
Week 5	Derivation trees for context free grammar
Week 6	Simplification of context free grammar
Week 7	Finite automata and their language
Week 8	Type of finite automata
Week 9	Context free grammer
Week 10	The equivalence of DFA and NDFA
Week 11	Regular expression (RE)
Week 12	Equivalence of FA and (RE)
Week 13	Context sensitive grammar
Week 14	How to solve laws of relations
Week 15	Other approaches to computability
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

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

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	• Discrete Mathematics and Its Applications_7th_Edition • Introduction to Languages and the Theory of Computation.	Yes
Recommended Texts	Theory and Applications of Computability, In cooperation with the association Computability in Europe.	No
Websites	https://bookauthority.org/books/best-computability-books	

Grading Scheme

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

Module Information

Module Title	**Data Structures**		**Module Delivery**	
Module Type	**B**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-202**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	2nd level	**Semester of Delivery**	1	
Administering Department	Cybersecurity Department.	**College**	CCMS	
Module Leader	Marwa Adeeb Muhammad	**e-mail**	marwa.a.aljawaherry@tu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Master	
Module Tutor	Assistant Lecturer. Shahad Mahmmod Mustafa	**e-mail**	Shahad.M.Mustafa@tu.edu.iq	
Peer Reviewer Name	Dr. Moceheb Lazam Shuwandy	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date	9/1/2025	**Version Number**	1.0	

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. Develop problem-solving skills and understanding of data structures. 2. This course deals with the basic concept of data structure. 3. Storing and organizing data in a computer. 4. To perform different types of data structures. 5. Providing a way to efficiently manage large amounts of data, such as large databases and Internet indexing services. 6. Different types of data structures are suitable for different types of applications. For example, (B-Tree) The binary tree is well-suited for implementing databases, while compiler implementations usually use hash tables to look up identifiers.
Module Learning Outcomes	1. Recognize Data representation, Abstract Data Types, Physical representation of data, Logical representation of data & array definition. 2. Recognize Python language, Variables & constant in python, Python primitive type, Assignment statement with primitive type. 3. Recognize One-dimensional array representation in memory, calculate the address of a one-dimensional array. 4. Recognize the two-dimensional array definition, and calculate the address of a two-dimensional array. 5. Recognize the Multidimensional array definition, calculate the address of the Multidimensional array. 6. Explain Stack, Stack algorithms, Stack application, convert infix to postfix, Check Matching brackets, Calculation postfix expression. 7. Explain Queue, Queue representation, Queue algorithms, Queue application, and Circular queue. 8. Recognize & Explain Sorting Algorithms, Selection Sort, Insertion Sort, Bubble Sort, Merge Sort. 9. Recognize & Explain Searching Algorithms, Sequential Search, Binary Search.
Indicative Contents	Indicative content includes the following.

Learning and Teaching Strategies	
Strategies	The main strategy for delivering this module will be to encourage students' participation in the exercises while 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)

Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	**125**		

Module Evaluation

		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)

	Material Covered
Week 1	Introduction - Data representation, Abstract Data Types, Physical representation of data, Logical representation of data & array definition
Week 2	Introduction to Python language, Variables & constant in python, Python primitive type, Assignment statement with primitive type
Week 3	One-dimensional array representation in memory, Calculation the address of one-dimensional array
Week 4	Two-dimensional array definition, Calculation the address of two-dimensional array

Week 5	Multidimensional array definition, Calculation the address of Multidimensional array
Week 6	Stack, Stack application
Week 7	Convert infix to postfix
Week 8	Check Matching brackets
Week 9	Calculation postfix expression
Week 10	Queue, Queue representation
Week 11	Queue algorithm, Queue application, Circular queue
Week 12	Sorting Algorithm, Selection Sort, Insertion Sort
Week 13	Bubble Sort, Merge Sort
Week 14	Searching Algorithm, Sequential Search
Week 15	Binary Search
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Introduction to Python language, Variables & constant in python.
Week 2	Lab 2: Python primitive type, Assignment statement with primitive type.
Week 3	Lab 3: One dimensional array definition in Python, Program for One dimensional array definition in Python.
Week 4	Lab 4: Two-dimensional array definition in Python. Program for Two-dimensional array definition in Python.
Week 5	Lab 5: Stack representation in Python.
Week 6	Lab 6: Convert infix to postfix.
Week 7	Lab 7: Check Matching brackets.
Week 8	Lab 8: Calculation postfix expression.
Week 9	Lab 9: Queue representation in Python.
Week 10	Lab 10: Queue program in Python.
Week 11	Lab 11: Searching in Array in Python. Sorting in Array in Python.
Week 12	Lab 12: Selection Sort, Insertion Sort.
Week 13	Lab 13: Bubble Sort, Merge Sort.

Week 14	Lab 14: Sequential Search.
Week 15	Lab 15: Binary Search.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Data Structures and Algorithms in Python, Michael T. Goodrich, John Wiley & Sons, 2015.	Yes
Recommended Texts	Python Data Structures and Algorithms, Benjamin Baka Packt Publishing Ltd, 2017.	No
Websites	YouTube: Various YouTube channels offer video tutorials and lectures on the Data Structure	

rading Scheme

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

Module Information					
Module Title	**Object-Oriented Programming (1)**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-201**				
ECTS Credits	**8.00**				
SWL (hr/sem)	**200**				
Module Level	2nd level		**Semester of Delivery**	1	
Administering Department	Cyber Security Dept.		**College**	CCMS	
Module Leader	Mohanad Hatem Ramadhan		**e-mail**	Mohanad.H.Ramadhan@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Master	
Module Tutor	Assist Lect. Mohammed Taher Ahmaed		**e-mail**	mohammed.t.a@tu.edu.iq	
Peer Reviewer Name	Dr. Maytham Mustafa		**e-mail**	maythamhammood@tu.edu.iq	
Scientific Committee Approval Date	18/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Teaching students: 1. How to write readable, reusable, and modular code. 2. Fundamental object-oriented programming concept. 3. Apply OOP concepts to your Python code. 4. Promotes students to enhance their coding ability.
Module Learning Outcomes	After this course, you will be able to 1- Use the basic Python programming concepts (Variables, Loops, and Functions) to instruct a computer to perform some basic tasks. 2- Manipulate common data structures in Python, including lists, tuples, dictionaries, and sets. 3- Build an algorithm to solve a problem and then convert it into a program. 4- How to architect larger programs using object-oriented principles. 5- Work with the core libraries used for data processing in Python. 6- Combine all of the above via the PyCharm Platform.
Indicative Contents	This course includes Introduction to programming concepts (Procedural and Object-Oriented Programming) with simple real-life projects thus, students will become familiar with project programming. **Procedural Programming**: The program consists of data and modules/procedures that operate on the data. The two are treated as separate entities. [8 hrs] **Dictionaries**: A collection of key-value pairs. It is used to store data values like a map, which, unlike other data types, can hold multiple values as elements [4 hrs] **Object-Oriented Programming:** All computations are carried out using objects. An object is a component of a program that knows how to perform certain actions and how to interact with other elements of the program. [8 hrs] **Encapsulation, Abstraction, Inheritance, and Polymorphism**: The benefits of using object-oriented programming concepts in creating programs for real-life problems. [8hrs]

	Python Standard Library: Is a collection of modules that are distributed with Python, which provides standardized solutions for many problems that occur in everyday programming. [8 hrs] **Coding real-life Projects in the lab**. [16 hrs]

Learning and Teaching Strategies

Strategies	To deliver this module effectively, we will engage students through active participation in exercises and activities that foster critical thinking. This will be accomplished through a combination of lectures and interactive labs, as well as by enhancing students' practical skills and proficiency by introducing them to emerging programming trends, such as mobile, IoT, e-commerce applications, open source, and GUI-based applications.

Student Workload (SWL)

Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	92	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Module Evaluation

		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)

	Material Covered
Week 1	Introducing Programming Concepts
Week 2	Arithmetic, logic, and comparison Operations
Week 3	Introducing Lists and Control Statements
Week 4	Dictionaries, Accessing, Adding, and Modifying Values
Week 5	Functions (Defining Functions, Passing Arguments, Return Values)
Week 6	Functions, Modules, Bug Busting, and Exceptions
Week 7	Classes and Objects (Creating and Using a Class)
Week 8	Classes and Objects (Inheritance)
Week 9	Classes and Objects (Examples on Class Inheritance)
Week 10	Classes and Objects (Importing Classes and Modules)
Week 11	Python Standard Library –Part 1
Week 12	Python Standard Library –Part 2
Week 13	Files and Exceptions
Week 14	Testing code (Testing Functions)
Week 15	Testing code (Testing Classes)
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: Prepare working environment
Week 2	Lab 2: Arithmetic, logic, and comparison Operations, Control Statements
Week 3	Lab 3: Arithmetic, logic, and comparison Operations, Control Statements
Week 4	Lab 4: Lists, 2D Lists, List Methods, Tuples and Dictionaries

Week 5	Lab 5: Exercises and small Project about functions
Week 6	Lab 6: Exercises and small Project about classes and objects
Week 7	Lab 7: Files and Exceptions

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	How to Think Like a Computer Scientist: Learning with Python	Yes
Recommended Texts	Python Crash Course, 2nd Edition. Copyright © 2019 by Eric Matthes.	No
Websites	Python Tutorial (w3schools.com)	

Grading Scheme

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

Module Information					
Module Title	**Cryptography (2)**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-211**				
ECTS Credits	7				
SWL (hr/sem)	**175**				
Module Level	2nd level		**Semester of Delivery**	2	
Administering Department	Cybersecurity Department.		**College**	CCMS	
Module Leader	Dr. Maytham Mustafa Hammoud		**e-mail**	maythamhammood@tu.edu.iq	
Module Leader's Acad. Title	Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Assist Lect. Shahad Mahmmod Mustafa		**e-mail**	Shahad.M.Mustafa@tu.edu.iq	
Peer Reviewer Name	Dr. Moceheb Lazam		**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date	19/1/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The objectives of advanced cryptography are to provide secure and private communication, protect data integrity, authenticate users and entities, ensure non- repudiation, manage cryptographic keys effectively, resist attacks, and adapt to emerging technologies and threats.
Module Learning Outcomes	1. Understanding of Cryptographic Concepts: Students will acquire a deep understanding of fundamental cryptographic concepts, including symmetric and asymmetric encryption, hash functions, digital signatures, key exchange protocols, and cryptographic primitives. 2. Mathematical Foundations: Learners will develop a strong grasp of the mathematical foundations behind cryptography, such as modular arithmetic, number theory, probability theory, and computational complexity theory. They will be able to apply these mathematical principles to analyze cryptographic algorithms and protocols. 3. Cryptographic Algorithms: Students will learn about various cryptographic algorithms and their properties, such as block ciphers (e.g., AES), stream ciphers (e.g., RC4), public-key algorithms (e.g., RSA, Diffie-Hellman), elliptic curve cryptography (ECC), and cryptographic hash functions (e.g., SHA-256). 4. Cryptographic Protocols and Systems: Learners will explore the design and analysis of cryptographic protocols and systems, including secure communication protocols (e.g., SSL/TLS), key exchange protocols (e.g., Kerberos), authentication protocols (e.g., HMAC), and secure multiparty computation protocols. 5. Cryptanalysis Techniques: Students will gain knowledge of various cryptanalysis techniques used to attack cryptographic systems. They will learn about brute-force attacks, differential and linear cryptanalysis, chosen-plaintext and chosen-ciphertext attacks, side-channel attacks, and timing attacks. Additionally, they will understand countermeasures to mitigate these attacks.

Indicative Contents	**Resistance to attacks**: Advanced cryptographic systems aim to withstand various types of attacks, including brute-force attacks, cryptanalysis, and side-channel attacks. The objective is to design encryption algorithms and protocols that are resistant to known attack methods and provide a high level of security. [15hrs] **Efficiency and scalability**: Advanced cryptography also considers the efficiency and scalability of cryptographic algorithms and protocols. With the increasing volume of data and computational power, it is important to develop cryptographic solutions that can be implemented efficiently and scaled to handle large-scale applications. [15hrs] **Post-quantum cryptography**: As quantum computers advance, a key objective in cryptography is to develop algorithms that are resistant to attacks by quantum computers. Post-quantum cryptography aims to provide secure solutions that can withstand attacks from both classical and quantum computers. [15 hrs]

Learning and Teaching Strategies

Strategies	Advanced cryptography strategies are techniques and methodologies used to enhance the security and effectiveness of cryptographic systems. These strategies aim to protect data confidentiality, integrity, and authenticity, even against sophisticated attacks.

Student Workload (SWL)

Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	82	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**175**		

Module Evaluation

		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)

	Material Covered
Week 1	Introduction to Fields, Characteristic of a field, prime fields, and Arithmetic of polynomials over fields.
Week 2	Field extensions, Galois group of a field extension, Fixed field, and Galois extensions.
Week 3	Minimum polynomial, Construction of fields with the help of an irreducible polynomial. Splitting field of a polynomial, Separable polynomial, and Separable extensions.
Week 4	Construction of finite fields and their structure. Enumeration of irreducible polynomials over finite fields. Fundamental Theorem of Galois Theory.
Week 5	Key Establishment Protocols, Key transport based on symmetric encryption, Key agreement based on symmetric techniques.
Week 6	Key transport based on public-key encryption, Key agreement based on asymmetric techniques.
Week 7	Key Management Techniques, Techniques for distributing public keys, Techniques for controlling key usage, Key management involving multiple domains.
Week 8	Key lengths and recommendations, user authentication: password, challenge-response and zero-knowledge protocols; server authentication.
Week 9	Secure online banking; digital cash, blockchain, cryptocurrencies; implementation aspects.

Week 10	Collision resistant hashing (MD5, SHA-1, SHA-2, SHA-3, HMAC, Merkle-Hellman),
Week 11	CCA security for symmetric encryption, simultaneous message confidentiality and message integrity.
Week 12	GCM mode, password-based secure computer access; implementation aspects: security performance-features tradeoffs.
Week 13	Advanced PKI Concepts, Certificate Authorities (CA), Certificate Management, Public Key Generation, Public Key Distribution.
Week 14	Cryptographic Secure Channels, The Application of Cryptography: TLS, VPN and IPSEC.
Week 15	quantum computing, quantum-resistant cryptography; implementation aspects: creating correct and secure programs.
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

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

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Cryptography Engineering: Design Principles and Practical Applications" by Niels Ferguson, Bruce Schneier, and Tadayoshi Kohno.	No
Recommended Texts	"Introduction to Modern Cryptography" by Jonathan Katz and Yehuda Lindell.	No
Websites	YouTube: Various YouTube channels offer video tutorials and lectures on the cyber security tools.	

Grading Scheme

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

Module Information					
Module Title	**Software Security**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-210**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2nd level	**Semester of Delivery**		2
Administering Department		Cybersecurity Department.	**College**		CCMS
Module Leader	**Layth Rafea Hazim**		**e-mail**		layth.r.hazim@tu.edu.iq
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		PhD
Module Tutor	Asst. Lect. Rana Hazim		**e-mail**		rhadi@tu.edu.iq
Peer Reviewer Name		Dr. Maytham Mustafa	**e-mail**		maythamhammood@tu.edu.iq
Scientific Committee Approval Date		22/1/2026	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understanding Security Concepts: The course aims to provide students with a solid understanding of the fundamental concepts and principles of software security. This includes knowledge of common security threats, vulnerabilities, and attacks that software systems can face. 2. Developing Secure Coding Skills: The course aims to equip students with the necessary skills to develop secure software. Students will learn about secure coding practices, including techniques to prevent and mitigate common coding vulnerabilities such as injection attacks, buffer overflows, and cross- site scripting. 3. Implementing Secure Software Development Practices: The course aims to familiarize students with secure software development methodologies and processes. Students will learn about the secure software development life cycle (SSDLC) and how to integrate security considerations into each phase of the software development process. 4. Designing Secure Software Architecture: The course aims to teach students about secure software architecture design principles and patterns. Students will learn how to identify and address security risks at the architectural level, including considerations for secure deployment and configuration management. 5. Enhancing Security Testing and Risk Assessment Skills: The course aims to enhance students' skills in security testing and risk assessment. Students will learn various techniques and tools for security testing, including penetration testing and vulnerability scanning. They will also gain knowledge about threat modeling and risk assessment methodologies to identify and prioritize security risks in software systems.
Module Learning Outcomes	1. Overview of software security principles and goals 2. Common security threats and attacks 3. Introduction to secure software development life cycle (SSDLC) 4. Identifying security requirements for software systems 5. Risk assessment methodologies and threat modeling. 6. Security metrics and measuring security effectiveness

Indicative Contents	The module covers the following topics: 1. **Introduction to Software Security** • Definition and importance of software security • Security goals (Confidentiality, Integrity, Availability) • Common software security challenges 2. **Secure Design Principles** • Least Privilege • Defense in Depth • Fail-Safe Defaults • Secure by Design 3. **Common Software Vulnerabilities** • OWASP Top 10 overview • Injection attacks (SQL, Command) • Cross-Site Scripting (XSS) • Broken Authentication • Security Misconfiguration 4. **Secure Coding Practices** • Input validation and sanitization • Output encoding • Error and exception handling • Secure session management 5. **Threat Modeling and Risk Assessment** • Introduction to threat modeling • STRIDE methodology • Risk identification and prioritization 6. **Secure Software Development Life Cycle (SSDLC)** • Security integration in requirements phase • Secure design and implementation

- Secure testing and maintenance

7. **Secure Software Architecture**

- Security patterns
- Secure deployment considerations
- Configuration management

8. **Authentication and Access Control**

- Authentication mechanisms
- Role-Based Access Control (RBAC)
- Multi-Factor Authentication concepts

9. **Security Testing Techniques**

- Static code analysis
- Dynamic testing
- Vulnerability scanning
- Basic penetration testing concepts

10. **Secure Data Management**

- Secure storage principles
- Password hashing concepts
- Cryptographic integration basics

11. **Software Supply Chain Security**

- Third-party and open-source risks
- Dependency management risks

12. **Incident Response in Software Systems**

- Identifying security incidents
- Reporting and mitigation procedures

Learning and Teaching Strategies

Strategies	Software security refers to the practice of implementing measures and techniques to protect software applications and systems from unauthorized access, data breaches, and malicious attacks. It involves ensuring the confidentiality, integrity, and availability of software and its associated data.

Student Workload (SWL)

Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	52	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	**100**		

Module Evaluation

		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)

	Material Covered
Week 1	Introduction to Software Security
Week 2	Software Security Requirements and Risk Assessment
Week 3	Secure Coding Practices • Understanding common coding vulnerabilities (e.g., buffer overflow, SQL injection) • Best practices for secure coding in popular programming languages • Code reviews and static analysis tools for vulnerability detection
Week 4	Web Application Security • Common web application vulnerabilities (e.g., cross-site scripting, cross-site request forgery) • Secure coding practices for web applications • Web application security testing techniques
Week 5	Secure Software Development Life Cycle (SSDLC) • Overview of the SSDLC phases (requirements, design, coding, testing, deployment) • Integrating security into each phase of the SSDLC • Security testing and code analysis throughout the development process
Week 6	Secure Software Architecture Secure software design principles and patterns • Secure software deployment and configuration management • Threat modeling and risk assessment for software architecture
Week 7	Secure Database Management • Securing databases against common vulnerabilities (e.g., injection attacks) • Encryption and key management for data at rest and in transit • Database security best practices and secure database administration
Week 8	Secure Mobile Application Development • Unique security challenges in mobile app development • Secure coding practices for mobile platforms (iOS, Android) • Mobile app security testing and vulnerability assessment
Week 9	Software Security Testing

	• Types of security testing (e.g., penetration testing, vulnerability scanning) • Security testing tools and techniques • Test planning and reporting for software security testing
Week 10	: Secure Software Maintenance and Patch Management • Importance of ongoing software maintenance for security • Patch management strategies and practices • Security incident response and handling
Week 11	Secure Coding Frameworks and Libraries • Introduction to secure coding frameworks (e.g., OWASP Top 10) • Secure coding libraries and their usage • Secure software development resources and references
Week 12	Secure Software Deployment • Secure software deployment methodologies (e.g., containerization, DevSecOps) • Cloud computing security considerations • Identity and access management in cloud environments
Week 13	Secure Coding for IoT and Embedded Systems • Security challenges in IoT and embedded systems • Secure coding practices for IoT and embedded software • Secure communication protocols for IoT devices
Week 14	Social Engineering and Human Factors in Software Security • Understanding social engineering techniques and prevention measures • Human factors in software security (e.g., user awareness, training) • Psychological aspects of security behavior
Week 15	**: Emerging Trends in Software Security** • **Exploration of emerging threats and attack vectors** • **Overview of cutting-edge security technologies (e.g., blockchain, AI)** • **Discussion on future directions and challenges in software security**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Designing Secure Software: A Guide for Developers, Loren Kohnfelder ,2021	NO
Recommended Texts	Web Application Security: Exploitation and Countermeasures for Modern Web Applications, Andrew Hoffman, O'Reilly Media; 1st edition 2020 Software Security: Building Security In, by Gary McGraw (Author), Addison-Wesley, 2006	NO
Websites		

Grading Scheme

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

Module Information					
Module Title	**Distributed Databases**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-209**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2nd level	**Semester of Delivery**		2
Administering Department		Cybersecurity Department.	**College**	CCMS	
Module Leader	Dr. Saddi Hammad Thalij		**e-mail**	saadi.alluhaibi@tu.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**Module Leader's Qualification**		PhD
Module Tutor	Assist Lect. Saba Alaa Abd Al-Wahab		**e-mail**	Saba.programmer12@tu.edu.iq	
Peer Reviewer Name		Dr. Moceheb Lazam	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date		22/1/2026	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To know the relational data model. 2. To express a database Schema. 3. To transform EER diagrams into relations. 4. To know the normalization concepts. 5. To understand how to normalize tables. 6. To connect the database with the C # language.
Module Learning Outcomes	. 1. Understand the relational data model. 2. Know different database schemas. 3. Understand how to convert E-R diagrams to relations. 4. Convert the enhanced E-R model to relations. 5. Understand normalization concepts. 6. Know how to perform normalization steps on tables. 7. Understand the Client/Server Architectures 8. Know Three-Tier Architectures
Indicative Contents	

Learning and Teaching Strategies	
Strategies	Distributed databases are database systems in which data is stored across multiple computers or servers connected by a network. In this architecture, the database is distributed and replicated across multiple nodes, allowing for improved scalability, fault tolerance, and performance.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**100**		

Module Evaluation

		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)

	Material Covered
Week 1	The Relational Data Model
Week 2	Expressing A Schema
Week 3	Transforming EER Diagrams into Relations
Week 4	Map Regular Entities and weak entities
Week 5	Map Binary Relationships, Map Associative Entities
Week 6	Map Unary Relationships
Week 7	Map Ternary (and N-Ary) Relationships

Week 8	Map Supertype/Subtype Relationships
Week 9	Normalization
Week 10	Functional Dependencies and Keys
Week 11	Normalization Example (Part 1)
Week 12	Normalization Example (Part 2)
Week 13	Normalization case study
Week 14	Database Application Development
Week 15	**Three-Tier Architectures**
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Join types
Week 2	Lab 2: Function in SQL
Week 3	Lab 3: Having
Week 4	Lab 4: Grouping
Week 5	Lab 5: Constraints
Week 6	Lab 6: Sub Queries
Week 7	Lab 7: Single Row Sub Query
Week 8	Lab 8: Multiple Row Sub Query
Week 9	Lab 9: Correlated Sub Query
Week 10	Lab 10: C# introduction
Week 11	Lab 11: C# important controls
Week 12	Lab 12: Connecting with ACCESS
Week 13	Lab 13: GUI tips
Week 14	Lab 14: Form control
Week 15	Lab 15: Reports

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Modern Database Management, Jeffrey A. Hoffer, Twelfth Edition SQL complete references	NO
Recommended Texts		
Websites		

Grading Scheme

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

Module Information

Module Title	**Cyber Security Tools**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	CYBS-208		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	2nd level	**Semester of Delivery**	2
Administering Department	Cybersecurity Department.	**College**	CCMS
Module Leader	Dr. Moceheb Lazam Shuwandy	**e-mail**	moceheb@tu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	PhD
Module Tutor	Assist Lect. Noor Soaad Abd	**e-mail**	noor.s.abd@tu.edu.iq
Peer Reviewer Name	Dr. Maytham Mustafa	**e-mail**	maythamhammood@tu.edu.iq
Scientific Committee Approval Date	22/1/2026	**Version Number**	1.0

Relation with other Modules

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

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. Understand the fundamentals of cybersecurity and the importance of security tools. 2. Gain practical knowledge of commonly used cybersecurity tools and their functionalities. 3. Learn how to assess and mitigate risks using cybersecurity tools. 4. Develop hands-on skills in deploying, configuring, and managing security tools. 5. Understand the role of cybersecurity tools in incident detection, response, and recovery.
Module Learning Outcomes	1. This course provides an overview of essential cybersecurity tools used to protect computer systems, networks, and data from cyber threats. Students will gain hands-on experience with various tools and learn how to analyze, detect, and respond to security incidents. The course will cover topics such as firewalls, intrusion detection systems, antivirus software, vulnerability scanners, and encryption tools. 2. Threat Detection: Cybersecurity tools employ various techniques like intrusion detection systems (IDS), intrusion prevention systems (IPS), and security information and event management (SIEM) to detect potential threats and malicious activities. These tools monitor network traffic, log files, and system behavior to identify indicators of compromise (IoCs) and abnormal activities. 3. Vulnerability Management: Cybersecurity tools help identify vulnerabilities in software, applications, and network infrastructure. Vulnerability scanners and assessment tools scan systems and provide reports on weaknesses and potential risks. This information is crucial for implementing patches, updates, and security measures to mitigate vulnerabilities. 4. Incident Response: When a security incident occurs, cybersecurity tools aid in incident response efforts. They provide real-time alerts, log analysis, and forensic capabilities to investigate incidents, determine the scope and impact of the breach, and assist in containing and remedying the situation. Incident response tools help.
Indicative Contents	**Firewalls**: The first line of defense in network security. They monitor and control incoming and outgoing network traffic based on predefined security rules, blocking potentially malicious connections. **Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS):** IDS tools monitor network traffic and systems for suspicious activities or known attack patterns, alerting administrators to potential security breaches. IPS tools go a step further by actively blocking or preventing malicious activities.

	Antivirus Software: Antivirus software scans files, programs, and systems for known malware signatures, protecting against viruses, worms, Trojans, and other malicious software. **Vulnerability Scanners:** Vulnerability scanners identify and assess security weaknesses in systems or networks. They help in identifying misconfigurations, outdated software, and other weaknesses that attackers could exploit. **Security Information and Event Management (SIEM) Tools:** SIEM tools collect and analyze security event data from various sources across a network, enabling centralized monitoring and incident detection. **Data Loss Prevention (DLP) Tools:** DLP tools prevent the unauthorized transfer or leakage of sensitive data by monitoring and controlling data access, usage, and transmission.

Learning and Teaching Strategies	
Strategies	It's important to note that cybersecurity tools are just one part of a comprehensive cybersecurity strategy. Proper implementation, regular updates, and ongoing monitoring are crucial for maintaining effective security in the face of evolving threats.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	62	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation

		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)

	Material Covered
Week 1	Introduction to Cybersecurity
Week 2	Overview of cybersecurity principles and concepts
Week 3	Understanding the threat landscape and attack vectors
Week 4	Legal and ethical considerations in cybersecurity
Week 5	Network Security Tools
Week 6	Firewalls: Types, configuration, and rule management
Week 7	Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS)
Week 8	Virtual Private Networks (VPNs) for secure remote access
Week 9	Malware Protection Tools
Week 10	Antivirus software: Scanning, signature-based detection, and heuristics
Week 11	Anti-malware tools and techniques
Week 12	Vulnerability Assessment and Management
Week 13	Encryption and Cryptography Tools
Week 14	Encryption algorithms and protocols
Week 15	Public key infrastructure (PKI) and digital certificates
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. Nessus: A vulnerability scanning 2. Burp Suite: A web application security testing tool	No
Recommended Texts	3. Wireshark: A network protocol 4. Metasploit: A penetration testing framework	No
Websites	YouTube: Various YouTube channels offer video tutorials and lectures on the cyber security tools.	

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

Module Information					
Module Title	**Object-Oriented Programming (2)**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYBS-207**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	2nd level		**Semester of Delivery**	2	
Administering Department	Cybersecurity Department.		**College**	CCMS	
Module Leader	Mohanad Hatem Ramadhan		**e-mail**	Mohanad.H.Ramadhan@tu.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	Master	
Module Tutor	Assist. Lect. Thulfiqar Muayad Hameedi. Assist. Lect. Mohammed Taher Mohammed		**e-mail**	tholfkar.m.himedy@tu.edu.iq mohammed.t.a@tu.edu.iq	
Peer Reviewer Name	Dr. Maytham Mustafa		**e-mail**	maythamhammood@tu.edu.iql	
Scientific Committee Approval Date	22/1/2026		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Teaching students: 1. How to write a readable, reusable, and modular Project. 2. How to refactor their code periodically. 3. Manipulate programming errors. 4. How to test and maintain their code.
Module Learning Outcomes	After this course, you will be able to 1. Introducing students to the Object-Oriented Programming manner, which gives them deep insight into the related main topics. 2. Design the class diagram and determine the main phases of the projects that will be created 3. Gaining the student the ability and confidence to improve existing projects toward implementing their own versions of the particular project. 4. Design and implement small projects that pave the way for them to enter the world of markets and meet their needs.
Indicative Contents	This course includes project planning and requirements definition, class diagram design, defining the main phases, project development, and, finally, testing and maintaining the project. **Project planning is** a procedural step in project management in which required documentation is created to ensure successful project completion. Documentation includes all actions required to define, prepare, integrate, and coordinate additional plans. [8 hrs] **Class diagram** - A type of diagram and part of a unified modeling language (UML) that defines and provides the overview and structure of a system in terms of classes, attributes, and methods, and the relationships between different classes. It is primarily designed for developers to provide the conceptual model and architecture of the system being developed. [8hrs]

	Main phases definition – a way of breaking down projects into more manageable and accurate parts. The number and names of the phases may vary, but some common ones are initiation, planning, execution, monitoring and control, and closure. Each phase has a different focus and requires different skill sets, tasks, processes, stakeholders, and organizations. [8 hrs] **Testing and Maintaining** - the process of verifying the accuracy and completeness of project deliverables before they are released to the customer. It is an essential part of quality assurance and helps to ensure that the final product meets the customer's expectations [16 hrs] **Coding real-life Projects in the lab.** [20 hrs]

Learning and Teaching Strategies	
Strategies	Our primary goal in delivering this module is to engage students through active participation and the development of critical thinking skills. To achieve this, we will survey new in-class learning aid frameworks, comprising work procedures and communication, and display devices. Such frameworks enhance students' understanding and maintain contact with the instructor as well as make students used to new technology.

Student Workload (SWL)			
Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	92	**Unstructured SWL (h/w)**	6

Total SWL (h/sem)	**200**

Module Evaluation

		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)

	Material Covered
Week 1	OOP Concepts (Quick Glance)
Week 2	Planning and Requirements Definition
Week 3	Class Diagram Designing
Week 4	Main Phases Definition
Week 5	Defining Related Libraries
Week 6	Main Screen Designing
Week 7	Classes Development (Create the main class)
Week 8	Classes Development (Create the other classes)
Week 9	Modules and Classes Importing (Connect the classes by importing)
Week 10	Code Refactoring I
Week 11	Classes Inheritance Managing
Week 12	Display Elements Managing
Week 13	Code Refactoring II
Week 14	Testing and Maintenance
Week 15	Experimental Results

Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: Planning and Requirements Definition
Week 2	Lab 2: Prepare the working environment
Week 3	Lab 3: Start Code the main class
Week 4	Lab 4: Install the additional required libraries
Week 5	Lab 5: improve the main class and Fix the attributes and methods related to the screen design
Week 6	Lab 6: Connect the classes by importing
Week 7	Lab 7: Graphical User Interface developing
Week 8	Lab 8: Testing and Maintain the Project

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Python Crash Course, 2nd Edition. Copyright © 2019 by Eric Matthes.	Yes
Recommended Texts	How to Think Like a Computer Scientist: Learning with Python.	No
	Python for Cybersecurity: Using Python for Cyber Offense and Defense.	
Websites	Python Tutorial (w3schools.com)	

Grading Scheme

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

– 49)				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.

Academic program

Course System - **Level 1** - 2025-2026

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Democracy and Human Rights**			**Module Delivery**	
Module Type	S			☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	CYBS-212				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1st level	**Semester of Delivery**		2
Administering Department		Cyber security dept.	**College**	CCSM	
Module Leader	Saad Hussain Ali		**e-mail**	saad.h.ali@tu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	**Module Leader's Qualification**		master
Module Tutor	None		**e-mail**		
Peer Reviewer Name		Dr. Moceheb Lazam Shuwandy	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date		22/1/2026	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The course aims to introduce human rights in order to defend human dignity and contribute to changing human life for the better regarding: change in values and feelings - and change in behavior, as well as promoting the idea of social justice and strengthening the link between the individual and the group and the state and its institutions, and developing monitoring skills Violations, dealing with violators, supporting the skills of understanding human rights issues, in addition to enhancing ways to participate in public affairs - citizenship.
Module Learning Outcomes	• Human rights are a set of fundamental entitlements and freedoms that are inherent to all individuals, regardless of their nationality, race, gender, religion, or any other characteristic. • They are based on the principles of dignity, equality, and respect for the inherent worth and value of every human being.
Indicative Contents	• Human rights are universal, meaning they apply to everyone, everywhere, without discrimination. They encompass civil, political, economic, social, and cultural rights, and are often codified in international and national legal frameworks. • Civil and political rights include the right to life, liberty, and security of person; freedom of expression, assembly, and association; the right to a fair trial; and protection against torture, arbitrary arrest, and discrimination.

Learning and Teaching Strategies	
Strategies	Civil and political rights include the right to life, liberty, and security of person; freedom of expression, assembly, and association; the right to a fair trial; and protection against torture, arbitrary arrest, and discrimination.

Student Workload (SWL)

Structured SWL (h/sem)	32	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	18	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Module Evaluation

		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)

	Material Covered
Week 1	Human Rights and Their Development in Human History
Week 2	Human Rights: Definition and Guarantees
Week 3	Content: Public Freedoms
Week 4	General Theory of Public Freedoms
Week 5	The Legal System of Public Freedoms
Week 6	Guarantees of Public Freedom

Week 7	The concept of equality
Week 8	Principles of public freedoms in detail
Week 9	Freedom, security, and peace
Week 10	Intellectual Freedom
Week 11	Freedom of Labor
Week 12	Freedom of Trade and Industry
Week 13	Freedom of Trade and Industry: Section One: Political Parties and Public Freedoms
Week 14	Section Two: Public Freedoms in the Third World
Week 15	Section Three: Scientific and Technological Progress and Public Freedoms
Week 16	Freedom of Labor

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	د.ام ي عبد العزيز، حقوق الأنسان في الأسلام	NO
Recommended Texts	نشين محمد عبده حسونه،2015 ، حقوق الانسان... المفهوم والخصائص والتصنيفات والمصادر	NO
Websites		

Grading Scheme

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

Module Information معلومات المادة الدراسية					
Module Title	Advanced Programming		**Module Delivery**		
Module Type	C		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**		
Module Code	TUCY111				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1st level		**Semester of Delivery**	2	
Administering Department	Cybersecurity		**College**	CCSM	
Module Leader	Rawan Adel Fawzi		**e-mail**	Rawan_adel@tu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Assist Lect. Noor Suaad Abd Assist Lect. Shahad Mustafa Mahmood		**e-mail**	Shahad.M.Mustafa@tu.edu.iq noor.s.abd@tu.edu.iq	
Peer Reviewer Name	Maytham Mustafa Hammoud		**e-mail**	maythamhammood@tu.edu.iq	
Scientific Committee Approval Date	22/1/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Programming Fundamentals	**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 Advanced Data Structures: The module aims to provide students with a deep understanding of arrays, strings, and their manipulation techniques. Students will learn about multidimensional arrays, character arrays, and string handling functions. 2. Mastery of Pointers: The module aims to develop students' proficiency in using pointers in C++. Students will learn the concepts of memory addresses, pointer arithmetic, and dynamic memory allocation. They will understand how to manipulate data using pointers and how to utilize them for efficient memory management. 3. File Handling and Input/Output Operations: The module aims to introduce students to file handling concepts and techniques in C++. Students will learn how to read from and write to files, open and close files, handle file errors, and perform various input/output operations using file streams. They will understand file modes, buffering, and error handling. 4. File Management and Organization: The module aims to teach students how to manage and organize files effectively in C++. They will learn to create, modify, and delete files, organize file directories, and handle file-related operations. Students will understand the importance of file management in real-world programming scenarios. 5. Practical Application and Problem-Solving: Throughout the module, students will be exposed to practical programming exercises and problem-solving tasks. They will apply the concepts learned to solve real-world programming challenges, consolidating their understanding and enhancing their problem-solving skills. By focusing on arrays, strings, pointers, and file handling in C++, this advanced programming module aims to provide students with a comprehensive understanding of these concepts and their practical application. Students will develop the skills necessary to manipulate complex data structures, handle files, and write efficient and reliable code.
Module Learning Outcomes	• Demonstrate an in-depth understanding of arrays, strings, pointers, and file

مخرجات التعلم للمادة الدراسية	handling concepts in C++. • Apply advanced array operations, such as searching and sorting algorithms, and multidimensional arrays to solve programming problems. • Manipulate strings effectively, including concatenation, substring extraction, searching, and sorting. • Utilize pointers proficiently for data manipulation, including memory addresses, and pointer arithmetic • Read from and write to files, perform input/output operations, and handle file-related errors using file streams in C++. • Manage and organize files effectively, including creating, modifying, deleting, and organizing file directories. • Apply efficient programming techniques, optimize code, and adhere to best practices for writing clean and readable code. • Demonstrate problem-solving skills by applying the learned concepts to solve real-world programming challenges. • Work collaboratively in teams, communicate effectively, and share knowledge and ideas related to advanced programming concepts. • Adapt to new programming concepts and technologies beyond the scope of the course, building a foundation for lifelong learning in programming. • These learning outcomes reflect the knowledge, skills, and competencies that students will acquire upon completing the advanced programming course. The outcomes emphasize both theoretical understanding and practical application, preparing students for real-world programming challenges and further studies in computer science.
Indicative Contents المحتويات الإرشادية	1. Review of Basic Programming Concepts: - Recap of fundamental programming concepts, including variables, data types, control structures, and functions. 2. Arrays: - Multidimensional arrays - Array manipulation techniques - Searching and sorting algorithms

	3. Strings: - String manipulation and operations - String handling functions 4. Pointers: - Introduction to pointers and their usage - Memory addresses and pointer arithmetic - Pointers to arrays 5. Files: - File handling concepts - Reading from and writing to files - File organization and management

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: The instructor will deliver lectures to introduce and explain programming concepts, C++ syntax, and problem-solving techniques. This will provide students with a solid theoretical foundation. 2. Interactive Discussions: Engaging students in interactive discussions allows them to ask questions, seek clarifications, and participate actively in the learning process. Discussions can include reviewing code examples, discuss programming best practices, and explore real-world applications of programming concepts. 3. Laboratory Sessions: Laboratory sessions are dedicated practical sessions where students apply the concepts learned in lectures to hands-on programming exercises. Key strategies for the laboratory sessions include: a. Programming Exercises: Students will work on programming exercises and projects in the laboratory, providing them with practical experience in coding and problem-solving. b. Guided Practice: Lab instructors or teaching assistants will be available to provide guidance, assistance, and immediate feedback on students' code. They can help students debug their programs, identify errors, and improve their

	coding skills. c. Collaboration and Peer Learning: Students can collaborate with their peers in the laboratory, fostering teamwork and enabling knowledge sharing. Working together on programming tasks promotes discussions, problem-solving, and peer learning. d. Equipment and Resource Access: The laboratory should provide access to computers, necessary software tools, programming references, and relevant online resources. This ensures that students have the necessary resources to complete their lab exercises and assignments effectively. 4. Programming Assignments: Assignments will be given to students to reinforce their understanding of programming concepts and encourage independent problem-solving. These assignments may involve implementing algorithms, designing software systems, or developing small-scale projects using C++. 5. Code Reviews and Feedback: The instructor will provide feedback on students' code, reviewing their solutions, and offering suggestions for improvement. This feedback will help students enhance their coding skills and adhere to best practices. 6. Office Hours and Individual Support: The instructor should be available for individual consultations and provide support to students who need additional help or guidance in understanding programming concepts or completing assignments.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	56	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	148		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 11	
	Assignments	4	20% (20)	7, 12	
	Projects	1	20% (20)	5-14	
	Report	1			
Summative assessment	**Midterm Exam**	2 hr	10% (10)	11	
	Final Exam	2hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Recap of fundamental programming concepts, including variables, data types, control structures, and functions.
Week 2	Introduction to Arrays (Linear arrays)
Week 3	Searching and Sorting Linear Arrays
Week 4	Multidimensional Arrays and Square Arrays
Week 5	Multiplication of Two Arrays and Re-write Tic-tac-toe game with Arrays
Week 6	Introduction to String and Its Operations
Week 7	More Examples on String
Week 8	Introduction to Pointers
Week 9	Pointer to Array and Pointer Arithmetic
Week 10	First Project Due (Reviewing and Comments)
Week 11	Introduction to Files and Directories
Week 12	Working with Text Files (Read, Write)
Week 13	Working with Binary Files
Week 14	Second Project Due (Students Presentations part1)
Week 15	Second Project Due (Students Presentations part1)

Delivery Plan (Weekly Lab. Syllabus): المنهاج الاسبوعي للمختبر:	
Week No.	Material Covered
Week 1	Getting used to CLI Interfaces and practicing some commands on PowerShell
Week 2	Running Examples on Array
Week 3	Practicing Arrays further (Searching)
Week 4	Practicing Arrays further (Sorting)
Week 5	Running Examples on 2D and Square Arrays
Week 6	Running Examples on Strings
Week 7	Searching in String
Week 8	Running Characters Frequency Example
Week 9	Running Examples on Pointers
Week 10	Running More Examples on Pointers
Week 11	Running Examples on Directories and Files
Week 12	Running More Examples on Files
Week 13	Running More Advanced Programs on Files
Week 14	Wrapping up
Week 15	Answering Students Questions and Extra Advising on Real World Application Programming

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stroustrup, Bjarne - Programming_ principles and practice using C++-Addison-Wesley (2015)	Yes
Recommended Texts	Olsson, Mikael - C++20 Quick syntax reference: a pocket guide to the language, apis, and library	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

Module Information معلومات المادة الدراسية					
Module Title	Arabic Language			**Module Delivery**	
Module Type	Elective			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOT001				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1st level		**Semester of Delivery**	2	
Administering Department	Cyber security dept.		**College**	CCSM	
Module Leader	Ahmed Mohammed Shareef		**e-mail**	ahmed.m.shareef@tu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor	None		**e-mail**	-	
Peer Reviewer Name	None		**e-mail**	-	
Scientific Committee Approval Date	22/1/2026		**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- Strengthening students' linguistic ability. 2- The student acquires full knowledge of the basics of the Arabic language and is provided with the skill of correct expression. 3- Clarifying the importance of grammatical rules of the language 4- Strengthening students' linguistic ability and knowing common mistakes in the language. 5- Knowing the basic rules and being able to use and apply them.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introducing the student to the terms related to the concept of spelling and grammar rules. 2. Introducing the student to grammar rules and the ability to use them 3. Introducing the student to grammar rules and the ability to use them 4. Introducing the student to the importance of accuracy in observation and distinguishing between right and wrong in what they hear or read, which helps them understand the meanings of sentences and styles 5. Introducing the student to the importance of accuracy in observation and distinguishing between right and wrong in what they hear or read, which helps them understand the meanings of sentences and styles 6. Introducing the student to speech and what it consists of 7. Introducing the student to speech and what it consists of 8. Introducing the student to distinguish between verbs, nouns and letters by displaying the signs of each section of speech 9. Introducing the student to the importance of accuracy in observation and distinguishing between right and wrong in what they hear or read, which helps them understand the meanings of sentences and styles 10. Introducing the student to speech and what it consists of 11. Introducing the student to distinguish between verbs, nouns and letters by displaying the signs of each section of speech 12. Introducing the student to non-declinable words 13. Introducing the student to non-declinable words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Introduction to spelling and grammar terminology – 6 hours • Grammar rules and correct usage in written and spoken language – 12 hours • Accuracy in language use and distinguishing correct from incorrect forms – 10 hours • Concept of speech and its components – 8 hours • Parts of speech: verbs, nouns, and particles – 8 hours • Indeclinable words and their usage – 6 hours
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports, etc.

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	2.0
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
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 #1-3 , LO# 4 - 7
	Assignments	2	10% (10)	2, 12	LO # 2, 4, LO#5 -8
	Seminar	1	10% (10)	11	LO # 1-8
	Report	1	10% (10)	12	LO # 1-8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Speech and what it consists of
Week 2	Verb types
Week 3	Noun and verb signs
Week 4	Ta Marbut and ta Mabuti
Week 5	The shortened noun, its dual and plural, and the extended noun, its dual and plural
Week 6	Kan and its sisters
Week 7	Kan and its sister’s types
Week 8	Verb-like letters and their meanings
Week 9	Mid-term exam

Week 10	Positions of breaking the hamza of in and opening it
Week 11	The subject and its states
Week 12	The inflected and the uninflected
Week 13	The five verbs and their inflection
Week 14	The non-declinable
Week 15	Preparation before the final exam
Week 16	Final exam.

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities

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	• General Arabic for non-specialized departments / Compiled and prepared by M.M. Bushra Adel Saleh / Tikrit University / Computer Science and Mathematics	Yes
Recommended Texts	• Explanation of Ibn Aqil and Qatar Al-Nada	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

Module Information معلومات المادة الدراسية					
Module Title	Coding and Information Theory			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	TUCY115				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1st level	**Semester of Delivery**		2
Administering Department		Cyber security dept.	**College**	CCSM	
Module Leader	Mohaned Diab Mahdi		**e-mail**	mohaned@tu.edu.iq	
Module Leader's Acad. Title		Asst. Prof. Dr.	**Module Leader's Qualification**		PhD
Module Tutor	None		**e-mail**		
Peer Reviewer Name		Dr. Moceheb L Shuwandy	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date		22/1/2026	**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	The objectives of the "Coding & Information Theory " course for first-year students in the Cybersecurity Department are to provide foundational knowledge and skills in cybersecurity. The key objectives include: 1. **Managing the fundamental components of an information system used in computer networks according to Shannon's theory.**

	This objective introduces students to how information systems operate within computer networks, focusing on data flow, processing, and management. Based on Claude Shannon's principles, students will learn how to analyze, optimize, and improve the efficiency of data transmission and storage. 2. **Evaluating the amount of information a source contains or its redundancy and determining its efficiency using mathematical methods.** This objective helps students understand how to quantify information content using mathematical formulas, such as entropy, which measures data uncertainty. Students will also learn how to detect redundant information and assess data efficiency to optimize data utilization. 3. **Differentiating between continuous and discrete information channels and mastering the methods of calculating their capacities.** Students will explore different types of information channels, including continuous channels (e.g., analog signals) and discrete channels (e.g., digital data). They will learn how to compute channel capacity, which determines the maximum data transmission rate without loss, based on Shannon's theorem. 4. **Acquiring detailed and practical knowledge of the fundamental types of source encoding and how to measure their efficiency.** This objective focuses on data encoding techniques that help compress and optimize data transmission. Students will study Shannon-Fano and Huffman coding, learning how to represent data using the fewest bits while preserving its original meaning. 5. **Gaining detailed knowledge of basic channel encoding techniques, including error detection and correction methods.** These objective covers channel encoding techniques that ensure error-free data transmission by adding extra information for error detection and correction. Students will learn about techniques such as Error Detection and Correction Codes, including the Hamming Code, that help maintain data integrity during transmission. 6. **Understanding the fundamental causes of channel errors and learning techniques to minimize their impact.** Students will examine common issues affecting data transmission, such as noise, interference, and distortion, which can lead to data loss or corruption. They will explore error-correction methods and channel-selection strategies to reduce errors and improve communication quality.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain and manage the fundamental components of information systems used in computer networks based on Shannon's information theory. 2. Calculate and evaluate the amount of information, redundancy, and efficiency of information sources using mathematical measures such as entropy. 3. Differentiate between continuous and discrete information channels and

	compute their channel capacities using Shannon's theorems. 4. Apply and analyze source encoding techniques, including Shannon–Fano and Huffman coding, to measure and improve encoding efficiency. 5. Demonstrate understanding and application of basic channel encoding techniques, including error detection and correction methods such as Hamming codes. 6. Identify the causes of channel errors and apply appropriate techniques to minimize their impact and enhance reliable data transmission.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Introduction to Coding and Information Theory • Overview of information systems in computer networks • Shannon's communication model and information flow • Principles of data transmission, processing, and storage efficiency • Measures of information: information content, entropy, redundancy, and efficiency • Mathematical evaluation of information sources • Continuous and discrete information sources • Continuous and discrete communication channels • Channel capacity and Shannon's channel capacity theorem • Noise, interference, distortion, and sources of channel errors • Fundamentals of source coding • Source encoding efficiency • Shannon–Fano coding techniques • Huffman coding techniques • Fundamentals of channel coding • Error detection methods • Error correction methods • Hamming code and basic error-control coding • Techniques for minimizing channel errors and improving transmission reliability

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	To ensure students achieve the required learning outcomes, the following **teaching and learning strategies** are implemented: 1. **Lectures and Explanations** ✓ Fundamental **concepts, theories, and mathematical models** in Coding and Information Theory are presented interactively. ✓ **Shannon's theory, entropy measurement, source encoding, and channel coding** are explained using real-world examples. 2. **Problem-Solving and Worked Examples** ✓ **Mathematical exercises** covering probability calculations, coding efficiency, and channel capacity are provided to strengthen students' analytical skills. ✓ Sample **exam-style questions** are discussed in class to help students prepare for assessments. 3. **Self-Learning and Independent Assignments** ✓ Students are assigned **independent research tasks**, such as studying error correction methods or analyzing the efficiency of compression techniques. ✓ **Homework assignments** include practical applications using **data analysis tools and coding techniques**. 4. **Use of Software and Practical Simulations** ✓ **Hands-on lab sessions** using software such as **MATLAB, Lab Mat, or Python** to implement **coding techniques, error detection, and correction methods**. ✓ Students develop **simulations of digital communication systems** and analyze the performance of various information channels. 5. **Class Discussions and Interactive Q&A** ✓ **Spontaneous questions** are asked during lectures to test student engagement and encourage critical thinking. ✓ **Group discussions** are held on modern applications of information theory, such as **cybersecurity, data compression, and digital communication**. 6. **Collaborative Learning and Group Projects** ✓ Students work in teams on projects related to **data analysis, encryption, and error correction techniques**. ✓ They are required to **present their reports and findings** to enhance communication and teamwork skills. 7. **Continuous Assessments and Quizzes** ✓ **Regular and surprise quizzes** are conducted to evaluate students' understanding of theoretical concepts. ✓ Students are assessed through **practical reports, assignments, midterm exams, and final evaluations**. 8. **Encouraging Creativity and Problem-Solving** ✓ Students are encouraged to **design new coding techniques** or

	analyze methods to **improve channel efficiency**. ✓ **Real-world challenges** are presented, requiring theoretical and practical solutions. **Assessment Methods** 1. **Regular and surprise theoretical tests** to measure conceptual understanding. 2. **Assignments and practical applications** to evaluate problem-solving skills. **Research reports and case studies** to enhance critical thinking and independent research.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	56	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	148		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1-3 , LO# 9 - 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, LO#8 -10
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	12	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Probability and Statistics Review, Definition of Alphabet, Random Variables
Week 2	Joint Probability, Conditional Probabilities, Bayes' Rule, Venn's Diagram
Week 3	Information Transmission Model, Logarithmic Measure of Information, Self-Information
Week 4	Definition of Information for Noisy Channels, Posteriori Probabilities
Week 5	Shannon Representation Diagram, Discrete Channel Parameters
Week 6	Average Information (Entropy) of Discrete and Continuous Sources, Maximum Entropy
Week 7	Transition Probability Matrix, Noiseless and Noisy Channels, Uniform Channel, Ternary Symmetric Channel
Week 8	Transmission over Noiseless and Noisy Channels, Binary and Ternary Symmetric Channels
Week 9	**Mid exam.**
Week 10	Channel Capacity for Noiseless Channels, Efficiency and Redundancy
Week 11	Binary Non-Symmetric Channel, Channel Capacity
Week 12	Mutual Information and Efficiency of Continuous Channels
Week 13	Entropy for Continuous Uniform and Gaussian Distribution Sources
Week 14	Band-Limited Channels, Shannon-Hartley Capacity Theorem, Nyquist Theorem
Week 15	Probability and Statistics Review, Definition of Alphabet, Random Variables
Week 16	**Final exam.**

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities 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	**Forouzan, B. A.** (2007). *Data Communications and Networking*. McGraw-Hill, Forouzan Networking Series. © The McGraw-Hill Companies, Inc.	Yes
Recommended Texts	**Cover, T. M., & Thomas, J. A.** (2006). *Elements of Information Theory* (2nd ed.). John Wiley & Sons.	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

Module Information معلومات المادة الدراسية					
Module Title	Cybersecurity Principles			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	TUCY113				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1st level		**Semester of Delivery**	2	
Administering Department	Cyber security dept.		**College**	CCSM	
Module Leader	Dr. Moceheb Lazam Shuwandy		**e-mail**	moceheb@tu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	PhD	
Module Tutor	Noor Suaad Abd		**e-mail**	noor.s.abd@tu.edu.iq	
Peer Reviewer Name	Dr. Maytham Mustafa		**e-mail**	maythamhammood@tu.edu.iq	
Scientific Committee Approval Date	22/1/2026		**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	The objectives of the **"Cyber Security Principles"** course for first-year students in the **Cybersecurity Department** are designed to provide foundational knowledge and skills in cybersecurity. The key objectives include: 1. **Understanding Cybersecurity Concepts** • Introduce students to fundamental cybersecurity principles, including confidentiality, integrity, and availability (CIA Triad).

- Explain the importance of cybersecurity in protecting digital assets and personal data.

2. **Identifying Cyber Threats and Attacks**
   - Familiarize students with common cyber threats such as malware, phishing, denial-of-service (DoS) attacks, and social engineering.
   - Analyze real-world case studies of cyberattacks and their impact on organizations.
3. **Security Mechanisms and Cryptography**
   - Introduce basic cryptographic principles, including encryption, hashing, and authentication methods.
   - Explain the role of encryption in securing communications and data storage.
4. **Access Control and Authentication**
   - Explore different authentication methods, including passwords, biometrics, and multi-factor authentication (MFA).
   - Understand access control models such as discretionary access control (DAC) and role-based access control (RBAC).
5. **Network Security Fundamentals**
   - Provide an overview of network security principles, including firewalls, intrusion detection systems (IDS), and secure network protocols.
   - Explain common vulnerabilities in network security and how to mitigate them.
6. **Secure System and Application Development**
   - Introduce secure coding principles to prevent common vulnerabilities like SQL injection and cross-site scripting (XSS).
   - Discuss security best practices in software and web application development.
7. **Cybersecurity Policies and Regulations**
   - Explain the importance of cybersecurity laws, regulations, and ethical considerations.
   - Introduce international standards and frameworks such as ISO 27001, NIST, and GDPR.
8. **Hands-on Practical Skills**
   - Provide students with practical experience using cybersecurity tools such as Kali Linux for ethical hacking and penetration testing.
   - Conduct lab exercises to reinforce theoretical knowledge with real-world applications.
9. **Incident Response and Risk Management**
   - Introduce the fundamentals of incident response and digital forensics.
   - Teach students how to identify, analyze, and respond to cybersecurity incidents.
10. **Developing a Security Mindset**

	• Encourage students to adopt a proactive approach to cybersecurity and risk assessment. Emphasize the importance of continuous learning and staying updated with emerging cyber threats.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Module Learning Outcomes: 2. By the end of this module, students will be able to: 3. Explain fundamental cybersecurity concepts, including the CIA Triad, and their role in protecting digital assets and personal data. 4. Identify and classify common cyber threats and attack types such as malware, phishing, DoS attacks, and social engineering, and analyze their real-world impacts. 5. Describe and apply basic security mechanisms and cryptographic principles, including encryption, hashing, and authentication. 6. Differentiate and evaluate authentication methods and access control models, including passwords, biometrics, MFA, DAC, and RBAC. 7. Explain core network security principles and assess common network vulnerabilities and mitigation techniques. 8. Apply secure coding principles and security best practices to reduce common system and application vulnerabilities. 9. Explain cybersecurity policies, laws, ethical issues, and international standards such as ISO 27001, NIST, and GDPR. 10. Demonstrate basic practical skills in using cybersecurity tools and performing introductory security labs and exercises. 11. Describe and apply the fundamentals of incident response, digital forensics, and cybersecurity risk management. 12. Adopt a security-focused mindset by proactively assessing risks and recognizing the importance of continuous learning in cybersecurity.
Indicative Contents المحتويات الإرشادية	**Indicative Contents** for the Cyber Security Principles course, aligned with the stated objectives and suitable for a first-year Cybersecurity program: • Introduction to cybersecurity and its importance • Cybersecurity concepts and principles • CIA Triad: confidentiality, integrity, and availability • Overview of cyber threats and attack types • Malware, phishing, social engineering, and DoS attacks • Case studies of real-world cyberattacks • Fundamentals of cryptography • Encryption, hashing, and authentication mechanisms • Access control concepts and models (DAC, RBAC) • Authentication methods: passwords, biometrics, and multi-factor authentication • Network security fundamentals

	• Firewalls, intrusion detection systems (IDS), and secure network protocols • Common network vulnerabilities and mitigation techniques • Secure systems and application development principles • Secure coding practices and common vulnerabilities (SQL injection, XSS) • Cybersecurity policies, laws, and ethical considerations • International cybersecurity standards and frameworks (ISO 27001, NIST, GDPR) • Introduction to cybersecurity tools and lab environments • Basics of ethical hacking and penetration testing • Incident response fundamentals • Digital forensics basics • Risk management and security assessment • Developing a cybersecurity mindset and continuous learning

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To ensure effective delivery of Cyber Security Principles in the first level of the Cybersecurity Department, the following teaching and learning strategies will be applied: **1. Interactive Lectures** **Objective:** Deliver fundamental concepts, theories, and principles of cybersecurity in an engaging manner. **Method:** Use PowerPoint presentations with real-world case studies. Include live demonstrations of cyber threats, attacks, and security mechanisms. Encourage active participation by posing thought-provoking questions and problem-solving scenarios.
	2. Practical Hands-on Labs **Objective:** Reinforce theoretical knowledge through real-world applications. **Method:** Conduct laboratory sessions using Kali Linux and security tools such as Wireshark, Nmap, and Metasploit. Simulate cyberattacks and defense strategies in a controlled environment. Assign step-by-step lab exercises to practice encryption, authentication, and penetration testing techniques.
	3. Problem-Based Learning (PBL) **Objective:** Enhance critical thinking and problem-solving skills. **Method:** Provide students with real-world cybersecurity problems and ask them to propose solutions. Use case studies of major cyberattacks and analyze how they could have been prevented. Encourage teamwork in solving cyber incident response challenges.

	4. Group Projects and Collaborative Learning **Objective:** Develop teamwork and research skills while applying cybersecurity principles. **Method:** Assign students to small groups to work on cybersecurity research projects. Have students design and implement security solutions for hypothetical organizations. Conduct peer evaluations to encourage collaboration and constructive feedback.
	5. Role-Playing and Simulated Cybersecurity Scenarios **Objective:** Prepare students for real-world cybersecurity challenges. **Method:** Conduct cyber incident-response simulations in which students act as security analysts. Use capture-the-flag (CTF) competitions to test cybersecurity skills in ethical hacking. Assign roles such as attackers, defenders, and forensic analysts to understand cyber operations from multiple perspectives.
	6. Flipped Classroom Approach **Objective:** Encourage self-directed learning and maximize in-class engagement. **Method:** Provide pre-recorded video lectures or reading materials before class. Use class time for discussions, practical exercises, and Q&A sessions. Implement short quizzes to assess pre-class learning.
	7. Use of Online Cybersecurity Platforms and Simulators **Objective:** Provide additional hands-on practice outside the classroom. **Method:** Use Cyber Ranges or online security labs (e.g., TryHackMe, Hack The Box). Integrate interactive learning platforms such as Coursera, Cybrary, or Open Web Application Security Project (OWASP). Assign virtual penetration testing challenges.
	8. Assessment through Real-World Application **Objective:** Evaluate students' ability to apply cybersecurity knowledge effectively. **Method:** Assign practical cybersecurity tasks rather than purely theoretical exams. Include mini-projects where students build security solutions. Use graded security audits where students assess vulnerabilities in simulated networks.
	9. Industry Guest Lectures and Cybersecurity Seminars **Objective:** Expose students to real-world cybersecurity challenges and industry practices. **Method:** Invite cybersecurity professionals to give guest lectures. Organize seminars on cybersecurity trends and attack case studies. Encourage networking with industry experts for career guidance.

	10. Continuous Assessment and Feedback **Objective:** Monitor student progress and provide timely support. **Method:** Use weekly quizzes and assignments to reinforce learning. Provide constructive feedback on lab exercises and projects. Conduct student reflection sessions to discuss learning challenges and areas for improvement.
	By implementing these strategies, students will gain both theoretical knowledge and practical expertise, ensuring they are well-prepared for advanced cybersecurity courses and real-world challenges.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	56	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	148		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1-3 , LO# 9 - 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, LO#8 -10
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	12	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction to Cybersecurity
Week 2	Cybersecurity Fundamentals
Week 3	Cyber Threats & Attack Vectors
Week 4	Malware & Social Engineering Attacks
Week 5	Cryptography & Data Protection
Week 6	Authentication & Access Control
Week 7	Network Security Basics
Week 8	Web Security & Secure Coding
Week 9	Cyber Incident Response
Week 10	Mid-Term Exam
Week 11	Cybersecurity Laws & Ethics
Week 12	Ethical Hacking & Pen Testing
Week 13	Cloud & IoT Security
Week 14	Security Risk Management
Week 15	Preparatory week before the final exam.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities

المنهاج الاسبوعي للمختبر:

	Material Covered
Week 1	Lab1_ Identify types of cyber threats and vulnerabilities
Week 2	Lab2_ Understand encryption basics and hashing techniques
Week 3	Lab3_ Wireshark, Firewall
Week 4	Lab4_ (OWASP)
Week 5	Lab5- Kali Linux / study penetration testing techniques and ethical hacking principles
Week 6	Lab6- Kali Linux / Conduct a security audit and risk assessment on a system
Week 7	Lab7-Practical Report & Discussion

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts	1- “Principles of Data Security” by Ernst L. Leiss, 2012. 2- “Principles of Information Security”, 7th Edition, by Michael E. Whitman, and Herbert J. Mattord, Kennesaw State University, 2022.	Yes
Recommended Texts	1- Kali Linux Revealed: Mastering the Penetration Testing Distribution”, Raphaël Hertzog, Jim O'Gorman, Mati Aharoni, 2017. 2- “The Web Application Hacker's Handbook”, by Dafydd Stuttard & Marcus Pinto, 2008.	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
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MODULE DESCRIPTION FORM

Module Information
معلومات المادة الدراسية

Module Title	Discrete Structure 2	**Module Delivery**	
Module Type	C	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	TUCY114		
ECTS Credits	4		
SWL (hr/sem)	100		

Module Level	1st level	**Semester of Delivery**	**2**
Administering Department	Cyber security dept.	**College**	CCSM
Module Leader	Marwa Adeeb Muhammad	**e-mail**	marwa.a.aljawaherry@tu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	master
Module Tutor	Yusuf Sufian Jghayyif	**e-mail**	yusuf.jghayyif@tu.edu.iq
Peer Reviewer Name	Rawan Adel Fawzi	**e-mail**	rawan_adel@tu.edu.iq
Scientific Committee Approval Date	22/1/2026	**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 Aims أهداف المادة الدراسية	1- Discrete structures provide the mathematical foundations for some fundamental discrete math subjects that are highly relevant for cybersecurity and cryptography. 2- Discrete structures are abstract mathematical structures used to represent discrete objects, and relations lie between those objects. 3- Students' realization of the basic concepts of discrete structure, such as mathematical logic and graphs. Graph types support specific analyses that can help cybersecurity professionals model and secure networks, detect vulnerabilities, and analyze encryption algorithms and protocols effectively. 4- Knowing the models of discrete structures and how to create them. 5- Developing students' ability to deal with transformations and their applications in constructing structures. 6- Giving the student the necessary experience to deal with the relations and applications 7- Giving students the necessary experience to understand graph types supports specific analyses that can help cybersecurity professionals model and secure networks, detect vulnerabilities, and analyze encryption algorithms and protocols effectively. 8- It is important for students to understand the structure of data sets, access control, and the mathematical foundation of database security.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. Explain the mathematical foundations of discrete structures and their relevance to cybersecurity and cryptography. 2. Define and describe discrete objects, relations, and abstract structures used in discrete mathematics. 3. Apply basic concepts of discrete structures, including mathematical logic and graph theory, to cybersecurity-related problems. 4. Construct and analyze models of discrete structures used in network security, vulnerability detection, and cryptographic systems. 5. Apply transformations and their applications in building and manipulating discrete mathematical structures. 6. Analyze and utilize relations and their applications in solving cybersecurity and data-related problems. 7. Evaluate different graph types and use them to model secure networks, analyze encryption algorithms, and detect vulnerabilities. 8. Explain and apply the mathematical foundations of data structures, access control, and database security.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Introduction to Discrete Structures and Cybersecurity Applications – 2 hours

	2. Sets, Relations, and Functions – 6 hours 3. Mathematical Logic and Proof Techniques – 6 hours 4. Transformations and Models of Discrete Structures – 4 hours 5. Graph Theory: Concepts, Types, and Representations – 8 hours 6. Graph Applications in Network Security and Cryptography – 6 hours 7. Data Structures, Access Control, and Database Security Foundations – 4 hours

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	• The teacher gives detailed theoretical lectures • The teacher requests periodic reports on the basic topics of the subject • The student is also assigned to self-read and to give the student a certain period to inquire and discuss the topics he has read. • Solve practical examples Evaluation modalities 1-Daily exams with practical and scientific questions. 2- Participation scores for difficult competition questions among students. 3- Setting grades for homework and the reports assigned to them.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	56	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	148		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1-3 , LO# 9 - 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, LO#8 -10
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	12	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Vectors and Matrices
Week 2	Algebra in the Matrices
Week 3	Determinants
Week 4	Cofactors & Minors
Week 5	Inverse Square Matrix
Week 6	Rule Grammer
Week 7	**Mid Exam**
Week 8	The Domain & the Range of a Relation
Week 9	Binary Relation**,** Graph of the Relation & Photographer representation of the relations
Week 10	Properties of relations with examples and Composition Relation
Week 11	Algebra of Functions, Models of Functions, and Graphing Functions
Week 12	Review of Graphs and Examples of Graphs
Week 13	Tree, Examples of Trees, and Pruning Algorithm for Minimal Path
Week 14	Basic number theory, Divisibility, Greatest Common Divisors, and Least Common Multiples
Week 15	Preparation before the final exam
Week 16	**Final exam.**

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities 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	• Theory and problems of Discrete mathematics, by Seymour Lipschutz & Marc Lars Lipson, Schaum's Outline Series, third edition 2007. • Discrete Mathematics and Its Applications, Seventh Edition, Kenneth H. Rosen, AT&T Laboratories, 2012.	Yes
Recommended Texts	• Mathematical foundation of computer science, Y.N. Singh, 2005 • Discrete structures, Amin Witno, Revision Notes and Problems 2006, www.witno.com • Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby	No
Websites	http://en.wikibooks.org/wiki/Discrete_mathematics/Set_theory	

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

Module Information

معلومات المادة الدراسية					
Module Title	Logic Design			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	TUCY112				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1st level		**Semester of Delivery**	2	
Administering Department	Cyber security dept.		**College**	CCSM	
Module Leader	Saif Muhannad Maher		**e-mail**	saif_muhannad1985@tu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	master	
Module Tutor	Yusuf Sufian Jghayyif		**e-mail**	yusuf.jghayyif@tu.edu.iq	
Peer Reviewer Name	Rawan Adel Fawzi		**e-mail**	rawan_adel@tu.edu.iq	
Scientific Committee Approval Date	22/1/2026		**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 develop problem-solving skills and an understanding of logic design

	2. Teaching students the computer numerical systems 3. Teaching the student the logic gates, their structure, and the truth table 4. Teaching the student the sequential logic circuits, their analysis and installation 5. Teaching students to design and analyze counters and registers and their types 6. Teaching the student the flip-flop, its types, the state table and the state diagram
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge of logic circuits and their design and analysis of complex and synchronous 2. Install logical gates and configure logical circuits 3. Application of logical circuits and their use in random memory 4. Mastering the work of gates and logical circuits and methods of connecting them 5. Knowing ways to connect and deal with half Adders as well as full Adder and how to connect their logical circuits 6. Know how to connect and deal with half-subtract as well as full-subtract and how to connect their logical circuits 7. Know the logical structure of a multiplexer and how to connect more than one multiplexer in a logical circuit 8. Knowledge of the logical structure of Flip-Flops of all kinds and how to connect more than one flip-flop in one logical circuit
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <u>Part A – Fundamental concepts</u> Numerical systems and how to convert between them and algebraic and logical operations on them, study logical gates and study how to draw circles and form logical circles from these gates and how to write the expression through drawing [12 hours] <u>Part B- Logic Expressions Simplify, Adder, Subtract</u> The laws of Boolean algebra are studied to simplify Boolean expressions. The K_map method is also studied and applied to simplify Boolean expressions. The addition process is studied using the half Adder and full Adder, and the subtraction process is studied using the half subtractor and full subtractor. [16 hours] <u>Part C- multiplexer, Decoder</u> A multiplexer, a Demultiplexer, and how to connect them are studied, along with how to form large multiplexers from small ones. Also, the decoder, encoder and how to connect their logical circuits are understood in detail, in addition to how to connect them together in one circuit. [16 hours]

	Part D- Flipflop types Is types of flip-flops are studied and their work is explained in detail and how they work, as well as an explanation of the counter shift register [16 hours)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This course is characterized by the fact that it needs a special approach based mainly on the development of engineering thinking and the mathematical approach to thinking. K. Teaching depends mainly on homework that is presented at the end of each week, and the student notes the interdependence between the topics of the series in this course, in addition to assigning the student (or a group of students) to write one report and present it as a seminar for the purpose of training in the use of scientific resources, in addition to Assigning the student with a set of practical experiments that he implements in the laboratory and others that are given as homework, which will help the student to understand more broadly how logical circuits work

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	56	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	148		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1-3 , LO# 9 - 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, LO#8 -10

	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	12	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to logic Design and numerical systems
Week 2	Convert between the numerical system and the mathematical operation on each system
Week 3	Logical gates and how to draw them, and draw logic expressions
Week 4	Simplifying Boolean expressions based on the laws of Boolean algebra
Week 5	Simplify Boolean expressions based on K_map (sop) ,(pos)
Week 6	Using a full Adder and a half Adder in addition
Week 7	Use full subtract and half subtract in subtraction
Week 8	Learn how multiplexers and demultiplexers work and how to connect their logic circuits
Week 9	Learn the work of the decoder and encoder and how to connect their logic circuits
Week 10	Learn about the working of the J-K flip-flop
Week 11	Learn about the working of the J-K flip-flop
Week 12	Learn about the working of the T flip-flop and the D flip-flop
Week 13	Learn about the working shift Register
Week 14	Learn about the working counters
Week 15	Learn how to draw complex logical circuits consisting of a group of logical circuits that have been studied in previous lectures
Week 16	**Preparatory week before the final exam.**

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities المنهاج الاسبوعي للمختبر:	
	Material Covered

Week 1	Lab1_ introduction to Multimedia Logic and crocodile program
Week 2	Lab2_ How to draw logical gates and form logical circuits
Week 3	Lab3_Simplify logical expressions and draw expressions before and after simplification, noting drawing outputs before and after simplification
Week 4	Lab4_Draw circles, half subtract full Adder, Half Adder, full subtract and observe the results of addition and subtraction
Week 5	Lab5-Draw multiplexer, demultiplexer, decoder, encoder logic circuits and how to connect them together in one logical circuit
Week 6	Lab6-Draw Flipflops logic circuits
Week 7	Lab7-Dealing with shift register and counter

rning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. principle of logic design (2020)by (Qasim mohammed Hussein)	Yes
Recommended Texts	Digital logic and computer Design by Morris Mano	No
Websites	Digital Logic And Computer Design By M. Morris Mano (2nd Edition).pdf - Google Drive	

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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Calculus I

تفاضل وتكامل 1

Module Information

معلومات المادة الدراسية

Module Title	Calculus I	Module Delivery
Module Type	S	☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	TUCY106	
ECTS Credits	3	
SWL (hr/sem)	75	

Module Level	1st level	**Semester of Delivery**	1
Administering Department	Cybersecurity Depart.	**College**	CCSM
Module Leader	م.م عادل علي سلطان	**e-mail**	alazawyadil63@gmail.com
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	Master
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	د.مصحب لزام شوندي	**e-mail**	moceheb@tu.edu.iq
Scientific Committee Approval Date	09/12/2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	Calculus II, Advanced Calculus	**Semester**	3

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

Module Aims أهداف المادة الدراسية	1. The goal of studying differential calculus at university is to enable students to gain a deep understanding of this fundamental element of mathematics and its applications in different fields. By studying differential calculus,

	students learn to compute derivatives and understand the derivative as the instantaneous rate of change of a function. Students can apply the concepts of calculus to solve practical problems, analyze the behavior of functions, determine critical points, the least and largest values of functions, and estimate changes of variable quantities. In addition, the study of differential calculus provides a foundation for other topics in mathematics, science, and engineering, such as integration, multivariable calculus, and the solution of differential equations. Learning differential calculus aims to develop students' analytical thinking and mathematical reasoning and to provide them with powerful mathematical tools to address complex technical and scientific problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	2. Deep understanding of concepts: Students are expected to gain a deep understanding of basic concepts in differential calculus. Students should be able to understand the concept of a derivative and its meaning as the rate of change of a function, as well as the concept of inverse differential and integration of functions. 3. Numerical and Application Skills: Students should acquire strong skills in calculating and using derivatives in solving applied calculus problems. They should be able to compute the derivative of a variety of functions and apply it to analyze function behavior, identify critical points, and estimate absolute values and variable ratios. 4. Analytical Thinking: By studying differential calculus, students are expected to develop abilities in analytical thinking and mathematical reasoning. They should be able to analyze mathematical problems and draw conclusions based on learned mathematical concepts and tools. 5. Applications in Other Fields: Students should have the ability to apply the concepts of differential calculus in other fields such as science, engineering, and economics. They learn how to represent real phenomena by functions and use differential calculus to analyze these phenomena and derive practical results. 6. Use of Technology: Students should have the ability to use appropriate technology such as mathematical calculation programs and
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: 1. Introduction to calculus: includes the definition of a derivative and the concept of a derivative as the instantaneous rate of change of a function. Students are exposed to the basic rules of calculus and related concepts. 2. The basic rules of differentiation: It includes studying the basic rules of differentiation such as the rule of differentiation rules, the rule of differentiation of constants, the rule of differentiation of forces, and other rules of differentiation of known functions.

	3. Higher Derivatives: Students learn how to calculate higher derivatives, how to work with recursive differentiation, and how to use differential rules related to it. 4. Applications in differential calculus: Students explore the practical applications of calculus in different fields such as physics, engineering, and computer science. Practical examples of solving various differential problems are presented. 5. Relative and Total Differential: Students learn the concept of relative differential and total differentiation and how to calculate them. They are exposed to its applications in analyzing the behavior of functions and estimating variable changes. 6. Practical Applications of Calculus: Students are introduced to the use of differential calculus in solving problems in mathematical modeling, economic analysis, statistics, and other fields.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Student interaction: Active participation and interaction between students and the lecturer or teacher is encouraged. Small group discussions or collaborative sessions can be organized to solve various differential problems. Technology, such as online forums or distance learning tools, can be used to encourage communication and collaboration among students. 2. Practical Application and Projects: The course should include practical activities and application projects that allow students to apply differential concepts and skills in real-world contexts. For example, teams can be formed to solve multidimensional differential problems or applications in fields such as engineering and medical science. 3. Use of Technology: Calculus software and mathematical applications can be used to enhance interaction and interactive learning. Students can use graphing software or computer mathematics programs to analyze functions and graph their curves. 4. Provide examples and practical exercises: A wide range of examples and practical exercises covering various differential calculus concepts should be provided. Students can practice solving the exercises

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.13

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.86
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 #1-3 , LO# 4 - 5
	Assignments	2	10% (10)	2, 12	LO #1-3 , LO# 4 - 5
	seminar	1	10% (10)	9	LO # 1-5
	Report	1	10% (10)	12	LO #2-5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to function, domain, range Invers functions, even and odd function
Week 2	. Graph the functions
Week 3	Limits and continuous
Week 4	Exponential Functions, Logarithm Functions, Trigonometric functions.
Week 5	Derivatives, Rules of differentiation, Applications of Derivatives.
Week 6	The mean value theorem
Week 7	**Mid-term exam**
Week 8	The derivative and extrema
Week 9	Derivatives of Exponential Functions , Logarithm Functions
Week 10	Derivatives of Trigonometric functions, Derivatives of inverse functions
Week 11	Integration
Week 12	The mean value theorem for integrals

Week 13	basic application of integration
Week 14	Area , volume
Week 15	Arc length
Week 16	**Preparatory week before the final exam.**

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities المنهاج الاسبوعي للمختبر: لا توجد فعاليات مختبرية	
	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	1. Courant, R., John, F., Blank, A. A., & Solomon, A. (1965). *Introduction to calculus and analysis* (Vol. 1). New York: Interscience Publishers. 2. Tall, D. (1996). Functions and calculus. *International handbook of mathematics education*, *1*, 289-325. 3. Tall, D. (1996). Functions and calculus. *International handbook of mathematics education*, *1*, 289-. 4. Marsden, J., & Weinstein, A. (1985). *Calculus I*. Springer Science & Business Media. 5. *Thomas' Calculus*, Early Transcendental, 12th ed.	No

	6. Calculus and Analytic Geometric, Durfee. W.H ,1971 New York (3).	
Recommended Texts	Grossman, Stanley I. *Calculus*. Academic Press, 2014.	No
Websites	https://books.google.iq/books?hl=ar&lr=&id=0aziBQAAQBAJ&oi=fnd&pg=PP1&dq=calculus+book&ots=a1k4tINdCZ&sig=tmAQQ_yHi9mTDBLcx-qi7hy9uo8&redir_esc=y#v=onepage&q=calculus%20book&f=false	

Grading Scheme مخطط الدرجات				
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MODULE DESCRIPTION FORM

Module Information

معلومات المادة الدراسية					
Module Title	Computer Organization			**Module Delivery**	
Module Type	Core			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	TUCY103				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1st level	**Semester of Delivery**		1
Administering Department		Cybersecurity Dept.	**College**	CCSM	
Module Leader	Saif Muhannad Maher		**e-mail**	saif_muhannad1985@tu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Master
Module Tutor	Yusuf Sufyan Jghayyif		**e-mail**	yusuf.jghayyif@tu.edu.iq	
Peer Reviewer Name		Dr. Moceheb L Shuwandy	**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date		17/9/2025	**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	This module aims to provide students with an in-depth understanding of how

أهداف المادة الدراسية	computers are organized and how they process information at the hardware level. The course covers the basic components of computer systems, system architectures, memory hierarchies, and input/output systems. By the end of this module, students should have a comprehensive knowledge of the functioning of modern computer systems and be able to apply performance evaluation techniques to analyze and compare various system configurations. The specific aims of the module are: 1. To introduce the fundamental components of a computer system, including the CPU, memory, I/O devices, and storage. 2. To explain different computer architectures (e.g., von Neumann, Harvard, RISC) and how these affect system performance. 3. To explore processor design, memory management, and input/output mechanisms. 4. To develop students' ability to analyze the performance of computer systems using benchmarking tools. 5. To lay the foundation for understanding more advanced topics in computer systems, including parallel processing and virtualization.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: 1. **Understand** the fundamental components of a computer system, including the CPU, memory, and I/O devices. 2. **Describe** different computer architectures (von Neumann, Harvard, RISC) and their impact on system design and performance. 3. **Explain** the organization and functionality of processors, including the control unit and arithmetic logic unit (ALU). 4. **Understand** the role of memory hierarchies (cache, main memory, secondary storage) in computer performance. 5. **Analyze** input/output systems, including interrupt handling, Direct Memory Access (DMA), and I/O performance considerations. 6. **Evaluate** the performance of different computer architectures using benchmarking and performance evaluation techniques. 7. **Understand** the operating system's role in managing resources, such as memory and processing time.
Indicative Contents المحتويات الإرشادية	1. **Basic Components of Computer Systems**: o CPU (Central Processing Unit) o Memory (RAM, ROM, Cache) o Input/Output Devices o Storage Devices (Hard drives, SSDs) 2. **System Architectures**: o Von Neumann Architecture

	o Harvard Architecture o Reduced Instruction Set Computing (RISC) o Instruction Sets and their impact on performance 3. **Processor Design**: o Control Unit and Arithmetic Logic Unit (ALU) o Pipelining and its challenges o Multi-core Processors and Parallel Processing 4. **Memory Systems**: o Memory Hierarchy: Cache, Main Memory (RAM), Secondary Storage (Hard drives, SSDs) o Virtual Memory and Paging o Memory Management Techniques 5. **Input/Output Systems**: o I/O Devices (Input devices, Output devices) o Interrupt Handling o Direct Memory Access (DMA) o I/O Performance Optimization Techniques 6. **Parallel Processing and Multiprocessing**: o Parallel Algorithms o Multi-core Processors o Parallel Architectures o Challenges of Parallel Computing 7. **Performance Evaluation**: o Benchmarking Techniques o Performance Metrics o Performance Analysis Tools and Techniques 8. **Operating Systems and System Software**: o Process Management o Memory Management o File Systems o Device Management o Scheduling Algorithms 9. **System Maintenance and Administration**: o Basic Troubleshooting and Performance Tuning o System Monitoring and Resource Management o Backup and Recovery Methods

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	10. **Basic Components of Computer Systems**: o CPU (Central Processing Unit) o Memory (RAM, ROM, Cache) o Input/Output Devices o Storage Devices (Hard drives, SSDs) 11. **System Architectures**: o Von Neumann Architecture o Harvard Architecture o Reduced Instruction Set Computing (RISC) o Instruction Sets and their impact on performance 12. **Processor Design**: o Control Unit and Arithmetic Logic Unit (ALU) o Pipelining and its challenges o Multi-core Processors and Parallel Processing 13. **Memory Systems**: o Memory Hierarchy: Cache, Main Memory (RAM), Secondary Storage (Hard drives, SSDs) o Virtual Memory and Paging o Memory Management Techniques 14. **Input/Output Systems**: o I/O Devices (Input devices, Output devices) o Interrupt Handling o Direct Memory Access (DMA) o I/O Performance Optimization Techniques 15. **Parallel Processing and Multiprocessing**: o Parallel Algorithms o Multi-core Processors o Parallel Architectures o Challenges of Parallel Computing 16. **Performance Evaluation**: o Benchmarking Techniques o Performance Metrics o Performance Analysis Tools and Techniques 17. **Operating Systems and System Software**: o Process Management o Memory Management

	○ File Systems ○ Device Management ○ Scheduling Algorithms 18. **System Maintenance and Administration**: ○ Basic Troubleshooting and Performance Tuning ○ System Monitoring and Resource Management ○ Backup and Recovery Methods

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.13
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	58	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.86
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 , LO# 10-14
	Assignments	2	10% (10)	2, 12	LO #10-14, LO#14-16
	Seminar	1	10% (10)	11	LO # 5-11
	Report	1	10% (10)	12	LO # 5-11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-17
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer Organization

Week 2	Computer Functions and System Architectures
Week 3	Instruction Set Architectures (ISA)
Week 4	Processor Design – Control Unit and ALU
Week 5	Memory Systems – Cache and Main Memory
Week 6	Secondary Storage and Virtual Memory
Week 7	Input/Output Systems – Part 1
Week 8	Input/Output Systems – Part 2 (DMA and Interrupt Handling)
Week 9	Parallel Processing and Multi-core Processors
Week 10	Review and Midterm Preparation
Week 11	Midterm Exam
Week 12	Advanced Processor Design – Pipelining and Parallelism
Week 13	Memory Management and Optimization Techniques
Week 14	I/O System Design and Performance Optimization
Week 15	Final Project and Preparatory Week for Final Exam

Delivery Plan (Weekly Lab. Syllabus):

المنهاج الاسبوعي للمختبر:

	Material Covered
Week 1	Introduction to Computer Organization Tools. Lab Focus: Introduction to simulation tools used in computer organization. Basic exercises to explore CPU and memory interactions. Lab Activity: Familiarization with the software environment. Perform a simple simulation to understand the CPU's basic operations.
Week 2	Exploring System Architectures (Von Neumann & Harvard) Lab Focus: Simulate von Neumann and Harvard architectures. Lab Activity: Compare data flow and instruction execution between the two architectures. Analyze how data and instructions are stored and processed differently.
Week 3	Instruction Set Architecture Simulation Lab Focus: Explore instruction execution in RISC and CISC architectures. Lab Activity: Simulate the execution of simple instructions in both RISC and CISC processors. Compare instruction execution cycles and performance differences.
Week 4	Processor Components – Control Unit and ALU Simulation Lab Focus: Simulate the operations of a control unit and ALU. Lab Activity: Execute a series of arithmetic and logical operations in the ALU. Explore how the control unit coordinates instruction execution.
Week 5	Cache Memory and Hierarchy Analysis Lab Focus: Simulate cache memory operations and analyze its role in performance. Lab Activity: Perform cache hit/miss analysis using different cache sizes and configurations. Observe how cache memory reduces access time compared to main memory.

Week 6	Virtual Memory and Secondary Storage Systems Lab Focus: Simulate virtual memory management and explore secondary storage access. Lab Activity: Implement page replacement algorithms (e.g., FIFO, LRU) in a virtual memory environment. Measure the performance impact of different secondary storage devices (HDD vs SSD).
Week 7	Input/Output Systems – Programmed and Interrupt-Driven I/O Lab Focus: Simulate basic I/O operations using programmed and interrupt-driven I/O. Lab Activity: Compare the performance of programmed I/O and interrupt-driven I/O. Explore how interrupts improve system efficiency by reducing CPU wait time.
Week 8	Direct Memory Access (DMA) and Interrupt Handling Lab Focus: Simulate DMA transfers and interrupt handling techniques. Lab Activity: Configure a DMA controller to handle large data transfers. Analyze how interrupts are used to manage I/O requests more efficiently.
Week 9	Multi-core Processor Simulation and Parallel Processing Lab Focus: Simulate multi-core processors and parallel processing tasks. Lab Activity: Explore task parallelism by executing different processes on multiple cores. Measure performance improvements when using parallel processing techniques.
Week 10	Performance Benchmarking and Analysis Lab Focus: Conduct performance benchmarking of different computer architectures. Lab Activity: Use benchmarking tools to measure system performance (e.g., CPU cycles, memory access times). Compare and analyze the performance metrics of single-core vs multi-core processors.
Week 11	Midterm Exam Lab Focus: Midterm practical exam covering the topics and lab exercises from Weeks 1-10. Lab Activity: Students will be required to demonstrate and apply their knowledge through simulations and problem-solving tasks based on previous lab work.
Week 12	Pipelining in Processor Design Lab Focus: Simulate pipelined processors and understand pipeline hazards. Lab Activity: Execute multiple instructions in a pipelined environment. Identify and solve pipeline hazards such as data dependencies and branch mispredictions.
Week 13	Memory Management Optimization Lab Focus: Explore memory management techniques and optimization strategies. Lab Activity: Simulate dynamic memory allocation and garbage collection mechanisms. Analyze how memory management techniques improve performance.
Week 14	I/O System Design and Optimization Lab Focus: Simulate advanced I/O system designs and optimize I/O performance. Lab Activity: Implement optimized I/O scheduling algorithms (e.g., FCFS, SSTF). Measure and analyze the latency and throughput of different I/O configurations.
Week 15	Final Project Presentation and Practical Exam Preparation Lab Focus: Final project presentations and practical exam preparation. Lab Activity: Students present their final projects to demonstrate an understanding of computer organization concepts. Conduct review exercises in preparation for the final practical exam.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	1. Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy. 2. "Computer Organization and Architecture: Designing for Performance" by William Stallings. 3. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne. 4. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne.	Yes
Recommended Texts	1. "Structured Computer Organization" by Andrew S. Tanenbaum and Todd Austin. 2. "Operating Systems: Internals and Design Principles" by William Stallings. 3. "Exploring Microsoft Office 2019" by Mary Anne Poatsy, Keith Mulbery, Cynthia Krebs, and Lynn Hogan.	No
Websites	https://ccms.tu.edu.iq/csd/electronic-lectures/409-stage1-8.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

Module Information معلومات المادة الدراسية		
Module Title	Data Security Principles	**Module Delivery**

Module Type	B		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**		
Module Code	TUCY105				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1st level		**Semester of Delivery**	1	
Administering Department	Cybersecurity Dept.		**College**	CCMS	
Module Leader	Dr. Moceheb Lazam Shuwandy		**e-mail**	moceheb@tu.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Lecturer. Noor Saud Abd		**e-mail**	noor.s.abd@tu.edu.iq	
B Peer Reviewer Name	Maytham Mustafa Hammood		**e-mail**	maythamhammood@tu.edu.iq	
Scientific Committee Approval Date	1/9/2025		**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	Cybersecurity Principles	**Semester**	2

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

Module Aims أهداف المادة الدراسية	1. To provide students with a foundational knowledge of data security principles and practices.

	2. To equip students with skills to recognize and mitigate various data security threats. 3. To introduce key data protection techniques, including encryption, authentication, and access control. 4. To ensure students understand the importance of data integrity, confidentiality, and availability. 5. To develop practical problem-solving skills related to securing sensitive data.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, students will be able to: - Define basic concepts in data security, such as confidentiality, integrity, and availability. - Identify different types of data security threats and vulnerabilities, and assess their potential impact. - Explain and apply cryptographic techniques, including encryption and decryption. - Describe and implement authentication methods and access control models. - Analyze and evaluate different data protection protocols and techniques. - Develop solutions to secure data in different scenarios, using appropriate security measures. - Understand the legal and ethical implications of data security and privacy, including regulatory compliance.
Indicative Contents المحتويات الإرشادية	1. **Introduction to Data Security Concepts:** • The importance of data security in information systems. • The CIA triad (Confidentiality, Integrity, Availability). 2. **Types of Security Threats and Vulnerabilities:** • Overview of security threats: viruses, malware, social engineering, etc. • Identifying common system vulnerabilities and their potential exploitation. 3. **Cryptography and Data Protection:** • Fundamentals of encryption (symmetric and asymmetric). • Overview of encryption algorithms: AES, RSA. • Key management and distribution. 4. **Authentication and Access Control:** • Authentication methods: passwords, multi-factor authentication. • Access control models: role-based access control (RBAC), mandatory

	access control (MAC). • Authorization and user management. 5. **Data Integrity and Secure Communication:** • Ensuring data integrity using hashing algorithms and digital signatures. • Secure communication protocols: SSL/TLS, HTTPS. 6. **Tools and Technologies for Data Security:** • Firewalls, Intrusion Detection Systems (IDS), Intrusion Prevention Systems (IPS). • Security practices for data storage and transmission. 7. **Data Privacy and Regulatory Compliance:** • Overview of data protection regulations (e.g., GDPR). • Ethical and legal considerations in data security. • Best practices for ensuring compliance with data privacy laws. 8. **Practical Application of Data Security:** • Hands-on exercises on encryption, access control, and vulnerability assessment. • Implementing basic data protection measures in lab environments.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Theoretical Lectures** Objective: To deliver fundamental concepts related to data security in a structured and clear manner. Method: Traditional lectures supported by various teaching tools such as presentations, diagrams, and case studies. Approach: Explain key concepts such as encryption, access control, and data security principles. Use real-life examples to illustrate the practical applications of these concepts. Provide opportunities for students to ask questions and engage in discussions to enhance their understanding. **2. Practical Sessions (Labs)** Objective: To enable students to apply theoretical concepts practically using tools and technologies related to data security. Method: Lab sessions focused on implementing encryption, managing access control, and securing data. Approach: Provide students with hands-on experience using cybersecurity tools and software. Offer guidance and feedback during practical exercises to ensure

	students achieve the desired outcomes. Encourage teamwork and collaborative problem-solving through lab activities. **3. Interactive Tutorials** Objective: To reinforce students' understanding of specific topics through group discussions and in-depth analysis. Method: Interactive tutorial sessions involving case studies, security problem analysis, and solution discussions. Approach: Break down complex topics into digestible parts to make them easier for students to grasp. Facilitate student participation in discussions and encourage critical thinking. Address any misconceptions and provide further clarification on difficult topics. **4. Practical Assignments and Projects** Objective: To allow students to apply theoretical and practical knowledge to real-world data security problems. Method: Assignments such as implementing encryption systems or developing access control policies. Approach: Assign practical tasks that align with the topics covered in lectures and labs. Provide clear instructions and ongoing support to ensure successful completion of tasks. Encourage both individual and group work to foster collaboration and independent problem-solving. **5. Blended Learning** Objective: To offer a mix of face-to-face and online learning for flexibility and enhanced comprehension. Method: Use of online platforms to share resources, conduct quizzes, and facilitate discussions. Approach: Provide digital learning materials, such as recorded lectures, quizzes, and discussion forums. Encourage students to engage with supplementary materials, including videos and articles, on the online platform. Foster online discussions to complement in-class learning. **6. Formative and Summative Assessments** Objective: To measure students' progress in the module and identify areas for improvement. Method: Regular assessments including quizzes, lab exercises, and a final project. Approach: Use formative assessments like short quizzes and lab exercises to provide continuous feedback. Employ summative assessments, such as final exams and practical projects, to assess overall understanding. Provide clear and constructive feedback to help students improve their performance. **7. Introductory Lectures on Future Developments in Data Security** Objective: To motivate students by offering insights into how theoretical

	knowledge can be applied in future career paths. Method: Organize introductory lectures or workshops on the latest trends and future directions in data security. Approach: Offer an overview of current trends and emerging technologies in cybersecurity. Help students understand how this knowledge will be valuable for their future skillset. Open discussions on the importance of data security across different industries and sectors.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.8
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**	5	10% (10)	3, 5, 7, 9, 13	#LO 1-3, #LO 5-6
	Assignments	2	10% (10)	7, 12	#LO 1-5, #LO 6-7
	Projects	2	10% (10)	10, 14	#LO 1-4, #LO 5-7
	Report	10	10% (10)	2,3,4,5,6,7,8, 9, 12, 13	#LO 1-7
Summative assessment	**Midterm Exam**	1 hr	10% (10)	11	#LO 1-4
	Final Exam	2 hr	50% (50)	16	All Learning Outcomes
Total assessment			100% (100 Marks)		All Learning Outcomes

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week No.	Material Covered

Week 1	Introduction to Data Security Concepts (CIA Triad)
Week 2	Types of Data Security Threats and Vulnerabilities
Week 3	Basics of Cryptography: Symmetric vs. Asymmetric Encryption
Week 4	Key Management and Encryption Standards (AES, RSA)
Week 5	Authentication Methods: Passwords, Multi-factor Authentication
Week 6	Access Control Models: Discretionary and Role-Based Access Control (RBAC)
Week 7	Data Integrity: Hashing, Checksums, and Digital Signatures
Week 8	Secure Communication Protocols: SSL/TLS, HTTPS
Week 9	Midterm Review and Practical Lab Recap
Week 10	Introduction to Firewalls and Intrusion Detection Systems (IDS)
Week 11	Midterm Exam: Assessing Knowledge of LO 1-7
Week 12	Data Privacy and Regulations: GDPR and Compliance
Week 13	Security Policies and Best Practices for Data Protection
Week 14	Disaster Recovery, Backup Strategies, and Data Availability
Week 15	Reviewing Students' Projects

Delivery Plan (Weekly Lab. Syllabus):
المنهاج الاسبوعي للمختبر:

Week No.	Material Covered
Week 1	Introduction to Basic Computer Skills: Navigation, File Management, and Operating Systems
Week 2	Introduction to Linux: Basic Commands and Navigation in Kali Linux
Week 3	Introduction to Kali Linux Interface: Understanding the Tools and Environment
Week 4	Basic Networking Concepts: Using Kali Linux to Explore Network Settings and IP Addresses
Week 5	Basic Encryption Concepts: Demonstrating Simple Encryption Tools in Kali Linux
Week 6	Introduction to Password-based Authentication: Setting and Managing Passwords in Kali
Week 7	Introduction to Hashing: Understanding and Applying Simple Hashing Techniques in Kali
Week 8	Using Kali Linux Tools for Basic Network Scanning and Security Exploration
Week 9	Midterm Lab Review: Recap of Basic Commands, Hashing, and Encryption Tools
Week 10	Introduction to Firewalls: Configuring Basic Firewalls Using Kali Linux

Week 11	Practical Lab Exam: Basic Skills in Linux Commands, Hashing, and Password Authentication
Week 12	Introduction to Secure Communication: Setting Up Basic SSL/TLS on Kali Linux
Week 13	Introduction to Data Backup: Simple Backup and Recovery Using Kali Linux
Week 14	Exploring Kali Linux Tools for Risk Assessment and Security Checks
Week 15	Final Review: Demonstrating Acquired Skills and Providing Feedback on Lab Activities

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Principles of Data Security" by Ernst L. Leiss, 2012.	No
	"Principles of Information Security", 7th Edition, by Michael E. Whitman, and Herbert J. Mattord, Kennesaw State University, 2022.	No
Recommended Texts	"Kali Linux Revealed: Mastering the Penetration Testing Distribution", Raphaël Hertzog, Jim O'Gorman, Mati Aharoni, 2017.	No
	"The Web Application Hacker's Handbook", by Dafydd Stuttard & Marcus Pinto, 2008.	No
Websites	Official Kali Linux Documentation: www.kali.org/docs	
	OWASP (Open Web Application Security Project): www.owasp.org	
	SANS Cyber Security Resources: www.sans.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 is 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

Module Information معلومات المادة الدراسية					
Module Title	Discrete Structure1			**Module Delivery**	
Module Type	Supportive			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	TUCS112				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1st level		**Semester of Delivery**	1	
Administering Department	Cybersecurity Dept.		**College**	CCSM	
Module Leader	Marwa Adeeb Muhammad		**e-mail**	marwa.a.aljawaherry@tu.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Master	
Module Tutor	Yusuf Sufian Jghayyif		**e-mail**	yusuf.jghayyif@tu.edu.iq	
Peer Reviewer Name	Dr. Moceheb Lazam Shuwandy		**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date	01/02/2025		**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	• Discrete structures provide the mathematical foundations for some fundamental discrete math subjects that are highly relevant for cybersecurity and cryptography. • Discrete structures are abstract mathematical structures used to represent discrete objects, and relations lie between those objects. • Students' realization of the basic concepts of discrete structure, such as mathematics logic, and graphs. Such as graph types support specific analyses that can help cybersecurity professionals model and secure networks, detect vulnerabilities, and analyze encryption algorithms and protocols effectively. • Knowing the models of discrete structures and how to create them. • Developing students' ability to deal with transformations and their • applications in constructing structures. • Giving the student the necessary experience to deal with the relations and applications • Giving students the necessary experience to understand graph types supports specific analyses that can help cybersecurity professionals model and secure networks, detect vulnerabilities, and analyze encryption algorithms and protocols effectively. • 8- It is important for students to understand data set structure, access control, and the mathematical foundations of database security.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1** Subject-specific skills: - Learn to prove the correctness and accuracy of the given issue, whether it is solvable or not, before starting to think about solving it. **2** Thinking skills: Giving the learner the skill to use logical hypotheses in building accurate software. **3** Giving the learner the skills to have the ability to build relationships between components, models and theoretical structures with algorithms and computer programs. **4** Enabling students to continue self-development after graduation. **5** Making the learner well acquainted with all types of logical deductive proof

	and types of proof by other methods. **6** Build basic causal skills in creating and validating algorithms and programs. - **7** Building skills to analyze and solve some important issues and the approximate time to solve them. - **8** Build skills on how to choose the appropriate solutions for some issues and designate the best algorithms to solve them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A – Mathematics Logic: Foundations of Logic: Overview, Proposition, Compound Proposition, How to Build a Truth Table, Logical operators, Bit operators and Translation of English Sentences into Propositional Logic and Vice Versa with some examples. [16 hours] Part B- Set theory Definition of sets, sets of numbers such as standard numerical, power set, cardinality, cartesian products of sets, Venn Diagram, set operations, Algebra of sets with some examples. It is important for understanding data set structure, access control, and the mathematical foundations of database security. [16 hours] Part C- Relations Definition of Relation, Graphical Representation of Relation, Properties of reflexive, symmetric and transitive relations with examples. [8 hours] Part D- Graph Theory Definition of Graph and examples, Types of Graphs as planar, Digraphs, Weighted, Bipartite, Hamiltonian path, Euler path, and Tree with examples. It helps model and analyze networks, understand attack paths, and detect vulnerabilities in network structures. [12 hours] Part E- Basic number theory for encryption Definition of number theory, divisibility and examples, Greatest common divisors, least common multiples, Modular Arithmetic with examples and concepts used in cryptographic algorithms like RSA and Diffie-Hellman. [8 hours]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	• The teacher gives detailed theoretical lectures • The teacher requests periodic reports on the basic topics of the subject • The student is also assigned to self-read and to give the student a certain period to inquire and discuss the topics he has read. • Solve practical examples Evaluation modalities 1-Daily exams with practical and scientific questions. 2- Participation scores for difficult competition questions among students. 3- Setting grades for homework and the reports assigned to them. 4- Quarterly exams for the academic curriculum in addition to the mid-year exam and the final exam.

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	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
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	15% (15)	4, 10,12	LO #1-5 , LO# 9 - 12
	Assignments	2	10% (10)	2, 12	LO # 3, 4, LO#8 -10
	Projects / Lab.				
	Report	1	10% (10)	12	LO # 8, 10 and 12
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Mathematical logic**
Week 2	**Logical operators**
Week 3	**Logical operators**
Week 4	**Logical Equivalences, Compound Propositions Classification**
Week 5	**Set of theory, Properties of set**
Week 6	**Sets of Numbers, Sets and elements, subsets**
Week 7	**Mid Exam**
Week 8	**Set's Algebra**
Week 9	**Relations**
Week 10	**Properties of relations with examples**
Week 11	**Review of graphs and types**
Week 12	**Tree**
Week 13	**Basic number theory. Divisibility**
Week 14	**Greatest Common Divisors, Least Common Multiples**
Week 15	**Modular Arithmetic**
Week 16	**Preparatory week before the final exam.**

Delivery Plan (Weekly Lab. Syllabus): There are no Lab activities المنهاج الاسبوعي للمختبر: لا توجد فعاليات مختبرية	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4 -7	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Theory and Problems of Discrete Mathematics, by Seymour Lipschutz & Marc Lars Lipson, Schaum's Outline Series, third edition, 2007 Discrete Mathematics and Its Applications, Seventh Edition, Kenneth H. Rosen, AT&T Laboratories, 2012	Yes
Recommended Texts	• Mathematical foundation of computer science, Y.N. Singh, 2005 • Discrete structures, Amin Witno, Revision Notes and Problems 2006, www.witno.com • Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby	No
Websites	• http://en.wikibooks.org/wiki/Discrete_mathematics/Set_theory	

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

Module Information معلومات المادة الدراسية					
Module Title	**English Language**			**Module Delivery**	
Module Type	**Elective**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOT002**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Cybersecurity Dept.		**College**	CCSM	
Module Leader	Ayham Mahmood Abbad		**e-mail**	ayham.m.abbad@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	------	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	18 /1 /2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	0
Co-requisites module	None	**Semester**	0

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To enable the students to communicate effectively and appropriately in real life situation. 2- To develop and integrate the use of the four language skills, i.e., Reading, Listening, Speaking, and Writing. 3. To use English effectively for study purposes across the curriculum.

	4. The ability to understand the meaning of words, phrases, and sentences in context. 5. The ability to speak and pronounce English correctly and intelligibly 6. The ability to write English correctly and master the Mechanics of writing; the use of correct punctuation marks and capital letters. 7- To acquire the ability to use a suitable dictionary to understand labels, simple notices and written instructions. 8- To enable the students to know the contemporary strategies in teaching and learning the English language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate through face-to-face conversations comprehension of simple words and phrases used in common everyday contexts. 2. Knowing the basic rules of the English language. 3- Familiarity with the four English language skills: listening, reading, speaking and writing. 4. Determine the negative effects of the mother tongue on the English language. 5. Interpreting the texts in different contexts. 6- Generate simple sentences containing learned vocabulary and using appropriate grammatical structures 7- Express awareness of social and environmental issues. 8- Acquire a varied range of vocabulary; understand increased complexity of sentence structures both in reading and writing. 9- Obtaining a core competency, such as developing the ability to express students' thoughts orally and in writing in a meaningful way in the English language. Enable students to communicate in English more confidently and effectively in their work or study environment.
Indicative Contents المحتويات الإرشادية	**Indicative content** - Teaching students how to communicate with each other in English by using the four skills: speaking, listening, reading, and writing. The use of different examples from everyday life, dialogues, conversations, and the weekly compositions is useful for further development.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- This course is characterized by the fact that it needs a special strategy that depends mainly on the development of the English language and its skills. It also depends on previous courses in real analysis, situation, and some imagination. Teaching is mainly based on the homework given at the end of each week, and students note the interdependence among the serial topics of this course. In addition to assigning the student (or a group of students) to conduct a seminar for training in the use of scientific resources and in the method of writing a subject in English. 2- The purpose of this module is to develop students' linguistic ability by focusing on the key skills of reading, writing, speaking and listening, to encourage students to become independent learners and to introduce them to strategies and skills to enable them to cope with the demands, both academic and cultural, of undergraduate study in an English-speaking environment.

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	1.2
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 #1-3 , LO# 4-7
	Assignments	2	10% (10)	2, 12	LO # 2, 4, LO# 5-8
	Seminar	1	10% (10)	11	LO # 1-8
	Report	1	10% (10)	12	LO # 1-8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	An introduction to English language.
Week 2	Unit (1) Hello am/ are/ is, my/your · This is … • How are you? • Good morning! What's this in English? • Numbers • Plurals
Week 3	Unit (2) Your World Countries • he/she/ they, his/her • Where's he from? fantastic/ awful/ beautiful · Numbers 11-30
Week 4	Unit (3) All about You Jobs • am/are/ is • Negatives and questions • Personal information • Social expressions
Week 5	Unit (4) Family and Friends our/their • Possessives • The family • has/have • The alphabet.
Week 6	Unit (5) The Way I live Sports/ Food/ Drinks • Present Simple - I/you/ we/ they • a/an Languages and nationalities • Numbers and prices.
Week 7	Unit (6) Every day the time • Present Simple-he/she · always/sometimes/never Words that go together • Days of the week.
Week 8	Unit (7) My favorites Question words • me/him/us/them • this/that Adjectives • Can I.?
Week 9	Unit (8) Where I live Rooms and furniture • There is/ are • Prepositions • Directions
Week 10	Unit (9) Times past Saying years • was/were born • Past Simple - irregular verbs • have/do/go • When's your birthday?
Week 11	Unit (10) We had a great time! Past Simple - regular and irregular • Questions and negatives • Sport and leisure • Going sightseeing.
Week 12	Unit (11) I can do that! can/can't · Adverbs • Adjective + noun • Everyday problems.
Week 13	Unit (12) Please and thank you, I'd like - some/any • In a restaurant • Signs all around.
Week 14	Unit (13) Here and now Colors and clothes • Present Continuous • Opposite verbs • What's the matter?
Week 15	Unit (14) It's time to go! Future plans • Grammar revision Vocabulary revision • Social expressions.
Week 16	Preparatory week before the final exam.

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities

المنهاج الاسبوعي للمختبر: لا توجد فعاليات مختبرية

	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	1- Oxford Headway Plus for Beginners. 2- New Headway English Course (2002) by Julia Starr Keddle.	Yes
Recommended Texts	English for Everyone	No
Websites	https://www.unionlearn.org.uk/english-and-maths-learning-resources-and-tools	

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

Module Information معلومات المادة الدراسية					
Module Title	**Programming (1)**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**TUCS110**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1st level		**Semester of Delivery**	1	
Administering Department	Cybersecurity Dept.		**College**	CCMS	
Module Leader	Rawan Adil Fawzi		**e-mail**	Rawan_adel@tu.edu.iq	
Module Leader's Acad. Title	Prof.		**Module Leader's Qualification**	PhD	
Module Tutor	Lecturer. Noor Saud Abd Assistant Lecturer. Shahad Mahmood Mustafa		**e-mail**	noor.s.abd@tu.edu.iq Shahad.M.Mustafa@tu.edu.iq	
Peer Reviewer Name	Dr. Maytham Mustafa		**e-mail**	maythamhammood@tu.edu.iq	
Scientific Committee Approval Date	1/9/2025		**Version Number**	1.0	

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

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 fundamental principles and concepts of programming. 2. To familiarize students with the syntax and structure of the C++ programming language. 3. To develop students' problem-solving skills and algorithmic thinking. 4. To enable students to design, implement, and test programs using C++ to solve computational problems. 5. To provide students with hands-on experience in programming through practical exercises, assignments, and projects. 6. To promote the use of modular programming techniques for creating reusable and maintainable code. 7. To enhance students' ability to debug and troubleshoot programs effectively. 8. To develop students' communication skills in expressing programming concepts and solutions clearly and effectively. 9. To prepare students for advanced programming courses and real-world software development scenarios, cipher algorithm programming.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students should be able to: ▪ Demonstrate a solid understanding of the fundamental principles and concepts of programming. ▪ Utilize the syntax and structure of the C++ programming language to write well-structured and efficient code. ▪ Apply problem-solving skills and algorithmic thinking to develop solutions for various computational problems. ▪ Design, implement, and test programs using C++ to solve specific tasks and challenges.

	▪ Utilize modular programming techniques to create reusable and maintainable code. ▪ Debug and troubleshoot programs effectively using appropriate debugging techniques and tools. ▪ Collaborate and work effectively in teams to complete programming projects. ▪ Communicate programming concepts, solutions, and ideas clearly and effectively, both orally and in written form. • Demonstrate a readiness to progress to more advanced programming courses or pursue a career in software development.
Indicative Contents المحتويات الإرشادية	▪ Introduction to Computer Science: - Overview of computer science as a discipline - Key concepts and principles in computer science - Role of programming in computer science ▪ Introduction to Computers, Binary System, and Information Representation: - Basics of computer architecture and components - Understanding the binary system and its significance in computing - Conversion between binary and decimal. - Representation of different data types in computers - ASCII and Unicode for character encoding ▪ Algorithm Design and Problem Solving: - Understanding algorithms and problem-solving strategies - Analyzing problem requirements and designing algorithmic solutions - Time and space complexity analysis

	- Representing algorithms with Pseudocode and Flowcharts: - Using pseudocode as a high-level representation of algorithms - Writing pseudocode to describe the logic and steps of an algorithm - Understanding flowcharts as visual representations of algorithms - Basic flowchart symbols and their meanings - Creating flowcharts to represent the flow of control in algorithms ▪ Introduction to C++: - History and features of the C++ programming language - Setting up a C++ development environment - Basic syntax and structure of C++ programs ▪ Variables and Data Types: - Declaring and initializing variables - Fundamental data types (integers, floating-point numbers, characters) - Working with constants and literals ▪ Operators and Expressions: - Arithmetic operators - Assignment operators - Comparison operators - Logical operators ▪ Control Structures: - Decision-making with if-else statements - Switch statements for multiple choices - Repetition with loops (while, do-while, for)

	- Handling user input and validation ▪ Functions: - Function declaration and definition - Parameters and argument passing - Return values and function overloading - Scope and lifetime of variables

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: The instructor will deliver lectures introducing and explaining programming concepts, C++ syntax, and problem-solving techniques. This will provide students with a solid theoretical foundation. 2. Interactive Discussions: Engaging students in interactive discussions allows them to ask questions, seek clarifications, and participate actively in learning. Discussions can include reviewing code examples, discuss programming best practices, and explore real-world applications of programming concepts. 3. Laboratory Sessions: Laboratory sessions are dedicated practical sessions where students apply the concepts learned in lectures to hands-on programming exercises. Key strategies for the laboratory sessions include: a. Programming Exercises: Students will work on programming exercises and projects in the laboratory, providing them with practical experience in coding and problem-solving. b. Guided Practice: Lab instructors or teaching assistants will be available to provide guidance, assistance, and immediate feedback on students' code. They can help students debug their programs, identify errors, and improve their

	coding skills. c. Collaboration and Peer Learning: Students can collaborate with their peers in the laboratory, fostering teamwork and enabling knowledge sharing. Working together on programming tasks promotes discussions, problem-solving, and peer learning. d. Equipment and Resource Access: The laboratory should provide access to computers, necessary software tools, programming references, and relevant online resources. This ensures students have the necessary resources to effectively complete their lab exercises and assignments. 4. Programming Assignments: Assignments will be given to students to reinforce their understanding of programming concepts and encourage independent problem-solving. These assignments may involve implementing algorithms, designing software systems, or developing small-scale projects using C++. 5. Code Reviews and Feedback: The instructor will provide feedback on students' code, reviewing their solutions and offering suggestions for improvement. This feedback will help students enhance their coding skills and adhere to best practices. 6. Office Hours and Individual Support: The instructor should be available for individual consultations and support students who need additional help or guidance in understanding programming concepts or completing assignments.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.13
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	108	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.2
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, 11	#LO 1-3, #LO 5-8
	Assignments	2	10% (10)	7, 12	#LO 3-5, #LO 5-8
	Projects	1	10% (10)	continuous	
	Report	1	10% (10)	14	#LO 1-8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	11	#LO 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week No.	**Material Covered**
Week 1	Introduction to Computer Science, Computer Components, Binary and Info Representation
Week 2	Algorithms Design and Writing Pseudocode
Week 3	Algorithms Design and Drawing Flowchart
Week 4	Introduction to Programming Languages (History, Categories, Main Differences) and, Introduction to Programming in C++ (Program Structure and Coding Environment)
Week 5	Variables, Datatypes, Output, and Input
Week 6	Operations (Arithmetic and Assignment) and Math Functions
Week 7	Operations (Comparison and Logical)
Week 8	Flow Control (if – else)
Week 9	Flow Control (switch – case)
Week 10	Loops (counter and cumulative variables)
Week 11	Uncountable Loops
Week 12	Nested Loops
Week 13	Functions
Week 14	Building a Tic-Tac-Toe Game
Week 15	Reviewing Students' Projects

Delivery Plan (Weekly Lab. Syllabus): المنهاج الاسبوعي للمختبر:	
Week No.	**Material Covered**
Week 1	Using the Operating System, Creating Files and Folders, Writing Text)
Week 2	Differences among (Text Editor, Word Processor, Code Editor, and IDE)
Week 3	Drawing (Drag and drop) Flowcharts
Week 4	Installing a C++ coding environment and running the Hello World program
Week 5	Running Examples on Variables, Datatypes, Output, and Input
Week 6	Running Examples on Operations (Arithmetic and Assignment) and Math Functions
Week 7	Running Examples on Operations (Comparison and Logical)
Week 8	Running Examples on Flow Control (if – else)
Week 9	Running Examples on Flow Control (switch – case)
Week 10	Running Examples on Loops (counter and cumulative variables)
Week 11	Running Examples on Uncountable Loops
Week 12	Running Examples on Nested Loops
Week 13	Running Examples of Functions
Week 14	Fixing problems in students' projects
Week 15	Applying the instructor's feedback on students' projects

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stroustrup, Bjarne - Programming_ principles and practice using C++-Addison-Wesley (2015)	Yes
Recommended Texts	Olsson, Mikael - C++20 Quick syntax reference: a pocket guide to the language, APIs, and library	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 is 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

Module Information معلومات المادة الدراسية					
Module Title	**Statistics and Probability**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**TUCY104**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Cyber Security Dept.		**College**	CCMS	
Module Leader	Saba Alaa Abdulwahhab		**e-mail**	saba.programmer12@tu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Master	
Module Tutor	Asst. Lect. Rana Nazhan		**e-mail**	rhadi@tu.edu.iq	
Peer Reviewer Name	Dr. Moceheb Lazam Shuwandy		**e-mail**	moceheb@tu.edu.iq	
Scientific Committee Approval Date	1/09/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	- Understand the laws of statistics and data distribution. - 2. Enable the student to transform large data into understandable shapes and illustrations, and to deduce statistical data. - 3. Provide the students with details statistics and data population. - 4.Define and explain the basic of probabilistic metrics like event, outcome, trial, simple event, sample space, Venn Diagram, tree diagram, and calculate the probability that an event will occur. - 5.Define and explain the basic of statistical measurements like Data Organization, variation, of central tendency. - 6.Express the concepts and principles of counting techniques (factorial, combination) and the basic principles of Probability Theory 7. Solve the problems about permutation, combination and Binomial Theorem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. After completion of course, students will be able to: 2. Able to apply Number theory in cyber security. 3. Understand the ideas of group, ring and an integral domain and be aware of examples of these structures in mathematics. 4. Understand probability and statical methods. 5. Understand Statistics theory and its use in cyber security. 6. Have a better, grounded understanding of statistics and be able confidently to have statistical discussions. 7. Have gained skills in writing statistical projects, as the prelude to further project report writing at higher institutions or workplace report writing. 8. Have the basis in statistics to open a potential career path, as many jobs see understanding how to manipulate data and interpret statistics as a huge asset.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Part A - statistic 1-Population, samples, type of samples, Random variables discrete variable, continuous variable, Data Organization. 2- frequency distribution, histogram. 3- measurement of central tendency - mean, median, mode. 4- measurements of variation -standard deviation, variance. 5- coefficient of variation, Correlation and Regression. Part b – probability. 1- Probability Theory -sample space, events, rules of probability. 2- Venn Diagram, tree diagram, probability theorems -Addition theorem.

	3- Multiplication theorem.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. The statistical in cyber-security developing data science techniques that enable large dynamic computer networks to identify intrusions and anomalous behavior and therefore protect against cyber-attacks and fraudulent activity. Using statistical methodology, machine learning and Big Data analytics the group develop tools to perform scalable anomaly detection in high volume data streams such as social networks, telecoms networks, network flow data, host-based sensor process-level data, cyber-physical and IoT data, pinpointing deviations from normal behavior. 2. Statistical techniques which have been so far been deployed include classification, data mining, streaming data analysis, cluster analysis, change point detection, graph analysis, topic modelling, penalized regression analysis, and machine learning. All of the work is motivated from real computer-network and internet data, with active government and industrial collaborators that include the Government's National Cyber Security Centre

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	92	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.13
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	108	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.2
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)	3,5, 10,12	LO #1-3 , LO# 9 - 11
	Assignments	2	10% (10)	2, 9	LO # 3, 4, LO#8 -10

	Projects / Lab.	1	10% (10)	continuous	
	Report	1	10% (10)	11,12.13	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	introduction to probability concepts
Week 2	statistic, population, variable
Week 3	Data Organization
Week 4	Data Description
Week 5	Measures of Variation: Variance & Standard Deviation
Week 6	Graphic
Week 7	**Mid-term exam**
Week 8	Counting techniques
Week 9	probability theory
Week 10	Theorems of Probability
Week 11	Theorems of Probability
Week 12	Bayes' Theorem
Week 13	Discrete Probability Distributions
Week 14	transition probabilities
Week 15	Markov chains
Week 16	Preparatory week before the final exam.

Delivery Plan (Weekly Lab. Syllabus):

المنهاج الاسبوعي للمختبر:

	Material Covered
Week 1	introduction to python concepts 1
Week 2	introduction to python concepts 2
Week 3	introduction to python concepts 3

Week 4	Data Organization/ Data Description in Python
Week 5	Measures of Variation: Variance & Standard Deviation in Python
Week 6	Graphic in Python
Week 7	**Mid-term exam**
Week 8	Counting techniques in Python
Week 9	probability theory in Python
Week 10	Theorems of Probability in Python
Week 11	Theorems of Probability in Python
Week 12	Bayes' Theorem in Python
Week 13	Discrete Probability Distributions in Python
Week 14	Discrete Probability Distributions in Python
Week 15	Transition probabilities in Python

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	7. Probability and statistics, theory and applications, Gunnar Blom 8. Probability and statistics for engineers, Richard L Scheaffer 9. Statistics: theories and applications, Joseph Inungo, 2006. 10. Introductory Statistics, Ronald J. Wonnacott	No
Recommended Texts	Python for Probability, Statistics, and Machine Learning	No
Websites	https://www.spps.org/cms/lib/MN01910242/Centricity/Domain/859/Statistics%20Textbook.pdf	

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)	A considerable amount of work is 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.