MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Organization**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CYS 103**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	CYS		**College**	CSIS	
Module Leader	Noorah jaber Faisal		**e-mail**	noura.jaber@alfarabiuc.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Msc	
Module Tutor	Mehdi salah		**e-mail**	mehdi.salah@alfarabiuc.edu.iq	
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Scientific Committee Approval Date	24/12/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand Computer Organization: Gain a solid understanding of the basic principles and components of computer organization and architecture, focusing on the von Neumann model. 2. Linux Proficiency: Develop proficiency in using the Linux operating system, with an emphasis on command-line interfaces, file management, and system administration, essential for cyber security applications. 3. Assembly Language Skills: Acquire the skills to read and write assembly language programs, enabling you to gain insight into low-level hardware interactions. 4. Memory Hierarchy Knowledge: Explore the concept of memory hierarchy, including RAM, ROM, and cache, and understand how it influences system performance. 5. CPU Architecture: Examine CPU architecture components, operation, and instruction set design, enabling you to comprehend the central processing unit's functionality. 6. Input/Output Devices: Gain insight into the functioning of common input/output devices and learn how to interact with them on Linux systems. 7. Hardware Vulnerabilities and Security: Identify hardware vulnerabilities and understand their implications in cyber security. Learn about potential cyber threats and how to mitigate them at the hardware level. 8. Shell Scripting Proficiency: Develop proficiency in Linux shell scripting to automate tasks, manage system resources, and enhance security. 9. Hands-on Experience: Acquire practical skills through hands-on labs, including assembly language programming, shell scripting, and securing Linux systems. 10. Group Project: Collaborate on a group project aimed at implementing security enhancements within a Linux environment, which requires teamwork and problem-solving. 11. Final Project Implementation: Implement and test the final group project, which focuses on improving security and operational aspects of a Linux system. 12. Project Presentation: Develop presentation skills by presenting the final project's outcomes and findings to peers and instructors. 13. Exam Preparation: Prepare for and perform well in exams, understanding the theoretical knowledge and practical skills learned during the course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Linux Proficiency: Upon completing this module, students will be proficient in using the Linux operating system, including the command-line interface, file management, and system administration tasks essential for cyber security applications. 2-Assembly Language Competence: Students will demonstrate the ability to read and write simple assembly language programs, enabling them to gain insights

	into low-level hardware interactions and enhance their understanding of computer organization. 3- Memory Hierarchy Understanding: Students will grasp the concept of memory hierarchy, including RAM, ROM, and cache, and comprehend how it impacts system performance and data storage. 4- CPU Architecture Knowledge: After completing this module, students will understand the fundamental components of central processing unit (CPU) architecture, operation, and instruction set design. 5- Input/Output Device Interaction: Students will have the knowledge and skills to interact with common input/output devices on Linux systems and appreciate their importance in computing. 6- Hardware Security Awareness: Graduates of this module will be aware of hardware vulnerabilities, their implications in cyber security, and various cyber threats at the hardware level. They will also have knowledge of mitigation strategies. 7- Shell Scripting Proficiency: Students will demonstrate proficiency in Linux shell scripting, allowing them to automate tasks, manage system resources, and enhance the security of Linux systems. 8- Hands-on Skills: Through hands-on labs, students will acquire practical skills in assembly language programming, shell scripting, and securing Linux systems, enabling them to apply their knowledge in real-world scenarios. 9- Group Project Collaboration: Students will collaborate effectively on a group project aimed at implementing security enhancements within a Linux environment, which requires teamwork, problem-solving, and practical application of learned concepts. 10- Project Implementation and Testing: Graduates will implement and test the final group project, demonstrating their ability to enhance the security and operational aspects of a Linux system. 11- Effective Presentation: Students will develop effective presentation skills by presenting the outcomes and findings of their final project to peers and instructors, enhancing their communication abilities. 12- Exam Performance: Graduates will excel in exams by demonstrating their theoretical knowledge and practical skills acquired throughout the course.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The "Computer Organization using Linux" course covers a range of topics. It introduces students to Linux basics, including system administration and file systems. It delves into assembly language programming, explores hardware essentials and security, and includes hands-on shell scripting. The course culminates in a group project where students apply their knowledge to enhance system security and present their findings.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes and the lab, interactive

	tutorials, and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	8.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer Organization: Overview of computer organization and architecture Data representation: Binary, hexadecimal, and ASCII
Week 2	Introduction to Computer Organization: Introduction to Linux and its importance in cyber security

	Installing and using Linux (hands-on)
Week 3	Von Neumann Architecture The von Neumann model CPU components and operation
Week 4	Memory hierarchy and storage devices Introduction to assembly language
Week 5	Central Processing Unit (CPU) CPU architecture and components CPU instruction set and addressing modes
Week 6	Assembly language programming Writing and executing assembly programs (hands-on)
Week 7	Memory (RAM) and Input/Output Devices Types of memory: RAM, ROM, cache Input and output devices: Keyboard, display, mouse File I/O in Linux
Week 8	Mid-term examination
Week 9	Computer Organization and Cyber Security Hardware vulnerabilities and cyber attacks Exploiting hardware for cyber threats
Week 10	Security implications and mitigation strategies Hands-on exercises on security assessments
Week 11	Shell Scripting and Final Project Advanced Linux shell scripting Developing scripts for automating tasks
Week 12	Group project on implementing security enhancements Project presentation and evaluation
Week 13	Final Project Implementation and Exam Review Implementing the final projects
Week 14	Review for the final examination Course wrap-up and discussion
Week 15	Final Project Submission and Exam Submission of final projects
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Linux Lab 1: - Familiarization with the Linux environment - Basic Linux commands and file manipulation - User and group management in Linux
Week 2	Linux System Administration Lab 2: - Managing processes in Linux - System monitoring and performance analysis - Software installation and updates in Linux
Week 3	File Systems and Storage Management Lab 3: - File system management in Linux - Disk partitioning and formatting - File permissions and access control in Linux
Week 4	Introduction to Assembly Language Lab 4: - Introduction to assembly language programming - Writing simple assembly programs
Week 5	Hardware Essentials Lab 5: - CPU architecture and assembly programming - Study of memory and storage devices - Understanding input and output devices
Week 6	Networking Basics Lab 6: - Basics of networking - Setting up a simple network - Introduction to network security measures
Week 7	Shell Scripting

	Lab 7: - Introduction to shell scripting - Writing and executing shell scripts - Automation of common tasks using shell scripts
Week 8	Midterm Review and Assessment Lab 8: - Revision and practice of key concepts - Assessment of course content and practical skills
Week 9	Group Project Initiation Lab 9: - Introduction to the group project - Formation of project groups - Brainstorming project ideas
Week 10	Group Project Work Lab 10: - Collaborative project work - Research and analysis of selected project topics - Begin project development
Week 11	Group Project Work Continues Lab 11: - Ongoing group project development - Troubleshooting and problem-solving - Regular project status updates
Week 12	Group Project Presentation Lab 12: - Practice and preparation for project presentations - Presentation skills and slide creation - Each group presents their project findings
Week 13	Peer Evaluation and Feedback Lab 13: - Peer evaluation of group projects - Feedback and discussions - Final project improvements
Week 14	Final Lab Lab 14:

	- Concluding lab for course reflection - Review of course objectives and student feedback - Wrap-up and Q&A session
Week 15	Final Project Presentation Lab 15: - Final project presentations - Each group presents their project to the class - Course conclusion and closing remarks

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**"Computer Organization and Design" by David A. Patterson and John L. Hennessy.**	No
Recommended Texts	Computer Organization and Design: The " Hardware/Software Interface" (RISC-V Edition), Authors: David A. Patterson and John L. Hennessy "Computer Systems: A Programmer's Perspective" Authors: Randal E. Bryant and David R. O'Hallaron	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.