	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Physics Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	Computer 2		**Module Delivery**	
Module Type	BASIC		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code				
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level			**Semester of Delivery**	
Administering Department	Medical Physics		**College**	Science
Module Leader	Dr. Manar Thayer Mansour		**e-mail**	manar.thaer@nahrainuniv.edu.iq
Module Leader's Acad. Title			**Module Leader's Qualification**	
Module Tutor			**e-mail**	
Peer Reviewer Name			**e-mail**	
Review Committee Approval			**Version Number**	

<table>
<tr><th colspan="4">Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><th colspan="4">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td colspan="3"><h2>Module Aims</h2>
Develop Core Competencies: To provide students with a thorough understanding of core concepts in computer science, including algorithms, programming, data structures, and software development.
Enhance Problem-Solving Skills: To equip students with the ability to solve complex problems using computational approaches and logical reasoning.
Introduce Advanced Topics: To expose students to advanced topics such as artificial intelligence, machine learning, cybersecurity, and data analytics.
Foster Ethical Awareness: To instill an understanding of ethical considerations and societal impacts of technology and computing.
Encourage Research and Innovation: To inspire students to engage in research activities and innovative projects.
<h2>Learning Outcomes</h2> By the end of the module, students should be able to: Understand Key Concepts: Demonstrate a deep understanding of fundamental and advanced computer science concepts.
Apply Programming Skills: Develop and implement efficient algorithms and programs using multiple programming languages.
Analyze and Solve Problems: Critically analyze problems and develop effective computational solutions.
Conduct Research: Perform independent research and contribute to the body of knowledge in the field of computer science.
Ethical Practices: Recognize and adhere to ethical standards and practices in computing and technology.
Communicate Effectively: Present technical information clearly and effectively, both in written and oral forms.
Work Collaboratively: Collaborate effectively within multidisciplinary teams.</td></tr>
<tr><td>Module Learning Outcomes</td><td colspan="3"><h2>Learning Outcomes</h2></td></tr>
</table>

مخرجات التعلم للمادة الدراسية	1. **Knowledge and Understanding**: o Demonstrate a comprehensive understanding of fundamental computer science principles and concepts, such as algorithms, data structures, and software engineering. o Explain the theoretical foundations of computer science, including computational theory and complexity. o Discuss the ethical, social, and legal implications of computing technologies. 2. **Practical Skills**: o Design and implement software solutions using appropriate programming languages and development tools. o Apply problem-solving techniques to develop efficient and effective algorithms. o Use software engineering principles and methodologies to manage and execute projects. 3. **Research and Analysis**: o Conduct research to stay updated with the latest advancements in computer science. o Analyze and evaluate computing systems and technologies. o Critically assess and synthesize research findings to inform practice and development. 4. **Communication and Collaboration**: o Communicate technical information effectively through written reports and oral presentations. o Work collaboratively in teams to achieve common goals and solve complex problems. o Demonstrate interpersonal skills and the ability to give and receive constructive feedback. 5. **Professional Development**: o Exhibit professionalism and ethical behavior in all aspects of work. o Develop a lifelong learning mindset to continuously improve skills and knowledge. o Prepare for professional careers in computer science by understanding industry standards and practices. 6. **Application and Integration**: o Apply theoretical knowledge to practical scenarios and real-world problems. o Integrate various computer science concepts and skills to develop comprehensive solutions. o Demonstrate the ability to learn and adapt to new technologies and methodologies.
Indicative Contents المحتويات الإرشادية	• **Introduction to Computer Science**

	• History and evolution of computing • Overview of computer systems and architecture • Basics of computer hardware and software • **Programming Fundamentals** • Basic syntax and semantics of programming languages (e.g., Python, Java, C++) • Control structures, functions, and data types • Introduction to object-oriented programming concepts • **Data Structures and Algorithms** • Arrays, linked lists, stacks, queues, trees, and graphs • Sorting and searching algorithms (e.g., bubble sort, merge sort, binary search) • Algorithm complexity and Big-O notation • **Software Development** • Software development lifecycle (SDLC) • Agile methodologies and version control (e.g., Git) • Debugging and testing techniques • **Database Systems** • Relational databases and SQL • Data modeling and database design • Transactions and concurrency control • **Operating Systems** • Processes, threads, and concurrency • Memory management and file systems • Security and protection mechanisms • **Networks and Communications** • Network architectures and protocols • Data transmission and network security • Internet and web technologies • **Artificial Intelligence and Machine Learning** • Introduction to AI concepts and techniques • Machine learning algorithms and applications (e.g., supervised learning, unsupervised learning)

	• Neural networks and deep learning
	
	• **Cybersecurity**
	
	  • Fundamentals of cybersecurity and cryptography
	  • Threats, vulnerabilities, and risk management
	  • Secure coding practices and incident response
	
	• **Human-Computer Interaction**
	
	  • Principles of user interface design
	  • Usability testing and evaluation
	  • Accessibility and user experience (UX) design
	
	• **Computer Graphics**
	
	  • Fundamentals of computer graphics
	  • Rendering techniques and algorithms
	  • Graphics programming and visualization
	
	• **Theory of Computation**
	
	  • Automata theory and formal languages
	  • Turing machines and computational complexity
	  • Decidability and undecidability
	
	• **Capstone Project**
	
	  • Integration of knowledge and skills from various areas of computer science
	  • Collaborative project development
	  • Presentation and demonstration of the final project

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Study Strategies** 1. **Understand the Basics**: Make sure you have a solid grasp of fundamental concepts like algorithms, data structures, and programming principles. These are the building blocks for more advanced topics. 2. **Practice Regularly**: Regular coding practice helps reinforce concepts and improves problem-solving skills. Websites like LeetCode, HackerRank, and Codeforces are great for practicing coding problems.

3. **Work on Projects**: Building real-world projects allows you to apply your knowledge and gain practical experience. Choose projects that interest you and align with your career goals.
4. **Learn Multiple Languages**: While specializing in one programming language is important, having a working knowledge of several languages (e.g., Python, Java, C++) can be beneficial.
5. **Participate in Competitions**: Joining coding competitions and hackathons can challenge you to think creatively and work under pressure. It's also a great way to network with other professionals.

Learning Resources

1. **Online Courses**: Platforms like Coursera, edX, and Udacity offer comprehensive courses on various computer science topics, often taught by industry experts and professors.
2. **Books**: Invest in well-regarded textbooks like "Introduction to Algorithms" by Cormen, Leiserson, Rivest, and Stein (CLRS), and "Clean Code" by Robert C. Martin.
3. **Tutorials and Documentation**: Websites like W3Schools, Mozilla Developer Network (MDN), and Stack Overflow are invaluable for tutorials and troubleshooting.
4. **Research Papers and Journals**: Stay updated with the latest advancements by reading research papers and journals in your areas of interest.

Problem-Solving Techniques

1. **Break Down Problems**: Divide complex problems into smaller, manageable parts. This approach makes it easier to tackle each part individually.
2. **Think Algorithmically**: Develop a habit of thinking about problems in terms of algorithms and data structures. This mindset will help you design efficient solutions.
3. **Debugging Skills**: Master the art of debugging. Use tools like print statements, debuggers, and logging to identify and fix issues in your code.
4. **Optimize Solutions**: Always strive to improve the efficiency of your solutions. Consider time and space complexity when designing algorithms.

Professional Development

1. **Networking**: Join professional organizations, attend conferences, and participate in online forums to network with peers and industry experts.
2. **Soft Skills**: Develop soft skills such as communication, teamwork, and project management. These are crucial for collaborating effectively in professional settings.

	3. **Stay Updated**: Technology evolves rapidly, so it's important to stay informed about the latest trends and advancements in the field. 4. **Certifications**: Obtain relevant certifications to validate your skills and knowledge. Popular certifications include AWS Certified Developer, CompTIA Security+, and Certified Ethical Hacker (CEH). **Career Strategies** 1. **Internships and Co-ops**: Gain practical experience through internships and cooperative education programs. These opportunities provide valuable insights into the industry. 2. **Personal Branding**: Create a professional online presence through a personal website, LinkedIn profile, and GitHub repository. Showcase your projects, achievements, and skills. 3. **Mentorship**: Seek out mentors who can provide guidance, support, and advice as you navigate your career path. 4. **Lifelong Learning**: Commit to continuous learning and professional development. The field of computer science is ever-changing, and staying ahead requires a commitment to growth.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
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	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Security and Networking, Security and Networking (Cont.): Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	Security and Networking (Cont.): Introduction to Network Troubleshooting, Common Network Issues and Symptoms, Network Troubleshooting Tools and Utilities, Security and Networking (Cont.): Using Command-Line Tools for Diagnostics, Identifying and Resolving Connectivity Issues, Diagnosing Network Performance Problems
Week 3	E-Commerce: Concepts of Electronic banking services this includes online banking: ATM and debit c a r d services, E-Commerce (Cont.): Phone banking, SMS banking, electronic alert, Mobile banking.
Week 4	Computer Troubleshooting: Introduction to Computer Troubleshooting, Common Hardware Issues and Solutions, Diagnosing Software Problems, Computer Troubleshooting (Cont.): Hardware Components: Diagnosis and Repair, Using Safe Mode for Troubleshooting.
Week 5	Computer Troubleshooting (Cont.): Troubleshooting Operating System Issues, Identifying and Resolving Blue Screen Errors, Dealing with Slow Computer Performance, Computer Troubleshooting (Cont.): Virus and Malware Removal Techniques, Updating Drivers and software
Week 6	Introduction to Al: Definition of Al, History of Al, Al Techniques and Approaches, Introduction to Al (Cont.): Key Characteristics of Al, Benefits of Al, Challenges and Ethical considerations, Introduction to Al (Cont.): Challenges and Limitations of Al, The Role of Data in Al Systems
Week 7	introduction to Al (Cont.): Al Tools and Frameworks, The Role of Al in Modern Smartphones: Al-Driven Mobile Technologies, Virtual Assistants (Siri, Google Assistant, Alexa), The Role of Al in Modern Smartphones (Cont.): Adaptive Learning, Real-Time Translation Services
Week 8	The Role of Al in Modern Smartphones (Cont.): The Future of Al in Smartphone Technology, Challenges of Implementing Al in Mobile Devices, Applications and Tools of Al:

	Overview of Al Applications in Various Industries, Education and Healthcare. Applications and Tools of Al (Cont.): Transportation and Advertising
Week 9	applications and Tools of Al (Cont.): Finance, Robotics and Automation Technologies, Applications and Tools of Al (Cont.): Al in Marketing: Targeting and Personalization
Week 10	Applications and Tools of Al (Cont.): Al in Image and Video Analysis, Smart Cities, Applications and Tools of Al (Cont.): Future Trends in Al Applications and Tools
Week 11	Al and Society: Introduction to Al and Its Societal Impact, The Role of Al in Enhancing Public Safety, Al and Society (Cont.): Cultural Perspectives on Al Adoption, Al and Governance: Policy Implications
Week 12	Ethical Challenges in Al: Introduction to Ethics in Al, Transparency and Explain ability of Al Systems, Privacy Concerns in Al Data Usage,
Week 13	Ethical Challenges in Al (Cont.): The Ethical Implications of Autonomous Systems, Ethics in Al- Driven Marketing and Advertising
Week 14	Ethical Challenges in Al (Cont.): Ethical Considerations in Education, Human Rights and Al Implementation, The Future of Al: Future trends in Al, recent research and emerging technologies
Week 15	
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB environment, interface, and basic commands
Week 2	Lab 2: Variables, data types, and basic mathematical operations
Week 3	Lab 3: Vectors and matrices: creation, manipulation, and indexing
Week 4	Lab 4: Matrix operations and built-in mathematical functions
Week 5	Lab 5: Scripts and basic programming concepts in MATLAB
Week 6	Lab 6: Logical operations and conditional statements (if, else, switch)
Week 7	Lab 7: User-defined functions and function files

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Artificial Intelligence: A Modern Approach — Stuart J. Russell & Peter Norvig	
Recommended Texts	Machine Intelligence: Concepts and Mathematics	
Websites	AI Foundations and Applications with MATLAB (Springer)	

APPENDIX:

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

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



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي