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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Algorithm design and analysis	**Module Delivery**	
Module Type	Core	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COMP2211**		
ECTS Credits	6.0		
SWL (hr/sem)	150		

Module Level	3	**Semester of Delivery**	2
Administering Department	Computer science	**College**	Science
Module Leader	Nadia Fadhil AL-Bakri	**e-mail**	Nadia.f.al-bakri@nahrainuniv.edu.iq
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	Ph. D.
Module Tutor	Nadia Fadhil AL-Bakri	**e-mail**	Nadia.f.al-bakri@nahrainuniv.edu.iq
Peer Reviewer Name	Ban N. Dhannoon	**e-mail**	ban.n.dhannoon@nahrainuniv.edu.iq
Scientific Committee Approval Date	31/ 3/ 2026	**Version Number**	1.0
Laboratory Techers	م. زينب حيدر م.م هناء مشجل		

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Programming Language	**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	• **Implementation of multiple algorithms, the purpose of which is to see these algorithms and show the best ones in terms of speed of implementation.** • **A student is also prepared with the ability to understand soring and searching methods.** • **Provides students high programming skills.** • **Enable students to write algorithms for the problems on paper and screen.** • **Preparing the ability to understand the problems to be solved and to find the desired goal represented by the solution to these problems through calculating the algorithm complexity.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• **Understand Key of algorithm designs: Define, explain, and apply fundamental steps for building.** • **Implement sorting and searching techniques: Write efficient code to implement and manipulate data structures using programming languages like Java.** • **Select Appropriate Data Structures: Choose the most appropriate data structures to solve specific problems based on performance needs.**
Indicative Contents المحتويات الإرشادية	• **High Knowledge about data manipulations skills.** • **High programming following and tracing.** • **The ability of implementing different techniques based on java.**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Problem solving Learning.** • **Deliver detailed explanations of key algorithm design.** • **Collaborative Learning.** • **Report requirements for new techniques.** • **Providing the HW solution for all.** • **The ability to use Java language, and applying the theory fundamentals and its use in different algorithms.** • **Improve the student's analysis and conclusion capabilities**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Algorithm fundamental and Properties
Week 2	• Analysis of an Algorithm • Algorithm Complexity
Week 3	• How to Determine Complexities • Searching methods
Week 4	Binary Tree construction
Week 5	Tree Traversals
Week 6	Mid1
Week 7	Deletion Methods in a Binary Tree
Week 8	Sorting Methods Definitions
Week 9	Bubble Sort,
Week 10	Selection Sort
Week 11	Insertion sort
Week 12	Merge Sort Methods
Week 13	Mid 2
Week 14	Shell Sort
Week 15	Quick Sort

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Assignments of programs in java
Week 2	Linear Search Algorithm
Week 3	Binary Search Algorithm
Week 4	Binary Tree implementation in java
Week 5	Tree Traversals Implementation in java
Week 6	Mid1
Week 7	Methods of Deletion in a Binary Tree implementation in java
Week 8	Sorting Methods Preparations and Implementation in java
Week 9	Bubble Sort Implementation in java
Week 10	Selection Sort Implementation in java
Week 11	Insertion Sort Implementation in java
Week 12	Merge Sort Methods Implementation in java
Week 13	Mid 2
Week 14	Shell Sort Implementation in java
Week 15	Quick Sort Implementation in java

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Providing high-quality printed paper lectures that cover the entire subject with exercises	available
Recommended Texts	**Textbook:** Algorithms, **Fourth Edition** / Robert SedgewickandKevin Wayne, Princeton University, Addison-Wesley 2011 Data Structures and Algorithms in Java™, Sixth Edition, Michael T. Goodrich,Roberto Tamassia, and Michael H. Goldwasser, Wiley, 2014	
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.