Ministry of Higher Education and Scientific Research - Iraq
Al-Mustaqbal University
College of Sciences
Cyber Security Science Department

# MODULE DESCRIPTOR FORM
# نموذج وصف المادة الدراسية

## Module Information
معلومات المادة الدراسية

| | | | |
|---|---|---|---|
| **Module Title** | SORTING AND SEARCHING ALGORITHMS | **Module Delivery** | |
| **Module Type** | BASIC LEARNING ACTIVITIES | | **-Theory Lecture**<br>**-Lab**<br>**-PracticalSeminar** |
| **Module Code** | UOMU033043 | | |
| **ECTS Credits** | 5:00 | | |
| **SWL (hr/sem)** | 125 | | |

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| **Module Level** | 2 | **Semester of Delivery** | 4 |
| **Administering Department** | Computer science | **College** | Computer science |
| **Module Leader** | Asst. Prof. Dr. Ali Kadhum | **e-mail** | ali.kadhum.mohammed@uomus.edu.iq |
| **Module Leader's Acad. Title** | Asst. Prof. Dr | **Module Leader's Qualification** | PhD in computer science |
| **Module Tutor** | None | **e-mail** | None |
| **Peer Reviewer Name** | | **e-mail** | |
| **Review Committee Approval** | | **Version Number** | |

## Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

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| **Prerequisite module** | **Data Structures** | **Semester** | 3 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Aims**<br>أهداف المادة الدراسية | 1. Explain the topic of algorithms<br>2. Explanation of topics: recursion, graphs, trees and their types, binary trees, binary search tree creation and addition and deletion operations, search algorithms and their types, sorting algorithms and their types<br>3. Write programs recursion, graphs, trees, binary trees, binary search tree creation and addition and deletion operations, search algorithms and their types, sorting algorithms and their types<br>4. A statement on how to deal with each type of algorithm used in searching for data and the algorithms used in sorting data |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | 1. an ability to identify, formulate, and solve complex programming problems by applying principles of science, and mathematics<br>2. an ability to apply programming design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors<br>3. an ability to communicate effectively with a range of audiences<br>4. an ability to recognize ethical and professional responsibilities in programming situations and make informed judgments, which must consider the impact of programming solutions in global, economic, environmental, and societal contexts<br>5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives<br>6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use programming judgment to draw conclusions<br>7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. |
| **Indicative Contents**<br>المحتويات الإرشادية | 1. Explain to the student how recursion works in different types of function<br>2. Teaching the student what is tree and graph structure<br>3. Explain to student how to great a binary tree and different functions on binary tree<br>4. Explain what is binary search tree and how to delete and insert nodes in a binary tree<br>5. Explain different algorithms for search and sorting algorithms performed on arrays |
| **Learning and Teaching Strategies**<br>استراتيجيات التعلم والتعليم | |
| **Strategies** | Lectures (Theoretical and Practical)<br>Examples, Homework and Programs<br>Exams and using modern data show devices to display lectures subjects.<br>References as books, internet subjects. |

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## Student Workload (SWL)
الحمل الدراسي للطالب

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| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 75 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 5 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 47 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | 125 | | |

## Module Evaluation
تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| **Formative assessment** | **Quizzes** | 1 | 10% (10) | 5 | LO # 1 and 3 |
| | **Practical Seminar(Lab).** | 2 | 15% (15) | Continuous | LO # 2 , 4 and 5 |
| **Summative assessment** | **Midterm Exam** | 1 hr | 15% (15) | 14 | LO # 1 to 5 |
| | **Final Exam** | 3hr | 60% (60) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

| | **Material Covered** |
|---|---|
| **Week 1** | Recursion |
| **Week 2** | Questions & examples about Recursion |
| **Week 3** | Graph , trees types of trees |
| **Week 4** | Questions & examples about Graph , trees types of trees |
| **Week 5** | Binary Tree |
| **Week 6** | Binary Tree scan |
| **Week 7** | Binary Tree Representations |
| **Week 8** | Binary search tree |
| **Week 9** | Create , insert & delete operations of binary tree |
| **Week 10** | Questions & examples about Create , insert & delete operations of binary tree |
| **Week 11** | Sorting Algorithms Selection sort algorithm |

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|---|---|
| **Week 12** | Exam |
| **Week 13** | Insertion sort<br>algorithm |
| **Week 14** | Searching Algorithms- Sequential search |
| **Week 15** | Binary search |
| **Week 16** | **Final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)**<br>**المنهاج الاسبوعي للمختبر** | |
|---|---|
| **Week** | |
| **Week 1** | Recursion ,Questions & examples about Recursion |
| **Week 2** | Graph , trees types of trees |
| **Week 3** | Questions & examples about Graph , trees types of trees |
| **Week 4** | Binary Tree |
| **Week 5** | Binary Tree scan |
| **Week 6** | Binary Tree Representations |
| **Week 7** | Binary search tree |
| **Week 8** | Create , insert & delete operations of binary tree |
| **Week 9** | Questions & examples about Create , insert & delete operations of binary tree |
| **Week 10** | Sorting Algorithms Selection sort algorithm |
| **Week 11** | Exam |
| **Week 12** | Insertion sort<br>algorithm |
| **Week 13** | Searching Algorithms- Sequential search, Binary search |

## Learning and Teaching Resources
مصادر التعلم والتدريس

| | **Text** | **Available in the Library?** |
|---|---|---|
| **Required Texts** | Author: MICHAEL McMillan. Title :" Data Structures and Algorithms Using C#" , 2007 | |
| **Recommended Texts** | Author : Thomas H. Cormen , CHARLES E. LEISERSON Title :"Introduction to Algorithms ", third edition ,2009 | |
| **Websites** | https://cs.uotechnology.edu.iq/images/mypdf/subjects/2is/2ndsort2024C2.pdf | |

**APPENDIX:**

| GRADING SCHEME<br>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 |
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| 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.