

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |                            |                               |                                                                                                                                                                          |
|------------------------------------|----------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                            |                               |                                                                                                                                                                          |
| Module Title                       | Data Structures&Algorithms |                               | Module Delivery                                                                                                                                                          |
| Module Type                        | Core                       |                               | <input checked="" type="checkbox"/> Theory<br>Lecture<br>Lab<br><input checked="" type="checkbox"/> Tutorial<br>Practical<br><input checked="" type="checkbox"/> Seminar |
| Module Code                        | COE207                     |                               |                                                                                                                                                                          |
| ECTS Credits                       | 6                          |                               |                                                                                                                                                                          |
| SWL (h/sem)                        | 150                        |                               |                                                                                                                                                                          |
| Module Level                       | 2                          | Semester of Delivery          | 4                                                                                                                                                                        |
| Administering Department           | Computer                   | College                       | Engineering                                                                                                                                                              |
| Module Leader                      | Abdullateef Ali Hussain    |                               | e-mail: Abdullateef.ali@alnaji-uni.edu.iq                                                                                                                                |
| Module Leader's Acad. Title        | Asst. Prof.                | Module Leader's Qualification | PhD in Computer Science                                                                                                                                                  |
| Module Tutor                       | Name (if available)        | e-mail                        | E-mail                                                                                                                                                                   |
| Peer Reviewer Name                 | Name                       | e-mail                        | E-mail                                                                                                                                                                   |
| Scientific Committee Approval Date |                            | Version Number                |                                                                                                                                                                          |

| Relation with other Modules       |        |          |  |
|-----------------------------------|--------|----------|--|
| العلاقة مع المواد الدراسية الأخرى |        |          |  |
| Prerequisite module               | COE204 | Semester |  |
| Co-requisites module              |        | Semester |  |

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Aims</b><br>أهداف المادة الدراسية                      | <div>1- The primary objective of data structures and algorithms (DSA) is to develop organized ways to store, process, and retrieve data.</div> <div>2- DSA enables programmers to design and analyze algorithms, choose appropriate structures for specific problems, and understand the performance of them in terms of time and space complexity.</div> <div>3- This knowledge is crucial for writing optimized and scalable software.</div> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | Describe several searching strategies and trace any of the taught hashing schemes. Use any of the taught sorting methods. Understand recursion and polymorphism and be able to use them in algorithm design. Distinguish between different algorithm design strategies.                                                                                                                                                                        |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                |                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                         |
|-------------------|-----------------------------------------|
| <b>Strategies</b> | Lectures, lab, and classroom discussion |
|-------------------|-----------------------------------------|

## Student Workload (SWL)

### الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

|                                                                                |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 90  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 60  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 150 |                                                                           |  |

| Module Evaluation     |                 |             |                  |          |                           |
|-----------------------|-----------------|-------------|------------------|----------|---------------------------|
| تقييم المادة الدراسية |                 |             |                  |          |                           |
|                       |                 | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
| Formative assessment  | Quizzes         | 3           | 20% (20)         | 5, 10,15 |                           |
|                       | Assignments     | 2           | 5% (10)          | 2, 12    |                           |
|                       | Projects / Lab. | 1           | 10% (10)         | 12       |                           |
|                       | composition     | 1           | 5% (10)          | 13       |                           |
| Summative assessment  | Midterm Exam    | 3 hr        | 10% (10)         | 8        |                           |
|                       | Final Exam      | 3 hr        | 50% (50)         | 16       | All                       |
| Total assessment      |                 |             | 100% (100 Marks) |          |                           |

| Delivery Plan (Weekly Syllabus) |                                                    |
|---------------------------------|----------------------------------------------------|
| المنهاج الاسبوعي النظري         |                                                    |
|                                 | Material Covered                                   |
| Week 1                          | Arrays                                             |
| Week 2                          | Simple Cryptography with Character Arrays          |
| Week 3                          | Two-Dimensional Arrays and Positional Games        |
| Week 4                          | Singly Linked Lists                                |
| Week 5                          | Circularly Linked Lists                            |
| Week 6                          | Doubly Linked Lists                                |
| Week 7                          | Stacks                                             |
| Week 8                          | Matching Parentheses and HTML Tags                 |
| Week 9                          | Queues, Solving the Josephus Problem Using a Queue |
| Week 10                         | Array Lists                                        |
| Week 11                         | Iterators                                          |
| Week 12                         | General Trees                                      |
| Week 13                         | Binary Trees                                       |
| Week 14                         | Tree Traversal Algorithms                          |

|                |                     |
|----------------|---------------------|
| <b>Week 15</b> | Graph Algorithms    |
| <b>Week 16</b> | General discussions |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المنهاج الاسبوعي للمختبر |                                                    |
|-------------------------------------------------------------------------|----------------------------------------------------|
|                                                                         | Material Covered                                   |
| <b>Week 1</b>                                                           | Arrays                                             |
| <b>Week 2</b>                                                           | Simple Cryptography with Character Arrays          |
| <b>Week 3</b>                                                           | Two-Dimensional Arrays and Positional Games        |
| <b>Week 4</b>                                                           | Singly Linked Lists                                |
| <b>Week 5</b>                                                           | Circularly Linked Lists                            |
| <b>Week 6</b>                                                           | Doubly Linked Lists                                |
| <b>Week 7</b>                                                           | Stacks                                             |
| <b>Week 8</b>                                                           | Matching Parentheses and HTML Tags                 |
| <b>Week 9</b>                                                           | Queues, Solving the Josephus Problem Using a Queue |
| <b>Week 10</b>                                                          | Array Lists                                        |
| <b>Week 11</b>                                                          | Iterators                                          |
| <b>Week 12</b>                                                          | General Trees                                      |
| <b>Week 13</b>                                                          | Binary Trees                                       |
| <b>Week 14</b>                                                          | Tree Traversal Algorithms                          |
| <b>Week 15</b>                                                          | Graph Algorithms                                   |
| <b>Week 16</b>                                                          | General discussions                                |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                                                                                                                                                                                   |                           |
|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                                 | Text                                                                                                                                                                                                                                              | Available in the Library? |
| <b>Required Texts</b>                                           | Data Structures and Algorithms, 6th Edition                                                                                                                                                                                                       | Electronic copy           |
| <b>Recommended Texts</b>                                        |                                                                                                                                                                                                                                                   | No                        |
| <b>Websites</b>                                                 | <a href="https://dl.ebooksworld.ir/motoman/Wiley.Data.Structures.and.Algorithms.in.Java.6th.Edition.www.EBooksWorld.ir.pdf">https://dl.ebooksworld.ir/motoman/Wiley.Data.Structures.and.Algorithms.in.Java.6th.Edition.www.EBooksWorld.ir.pdf</a> |                           |

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