

2025-2026

First semester



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                                   |            |                                                                                                                                                                                                                                                     |                                    |       |
|------------------------------------|-----------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------|
| معلومات المادة الدراسية            |                                   |            |                                                                                                                                                                                                                                                     |                                    |       |
| Module                             | Introduction to AI                |            | Module Delivery                                                                                                                                                                                                                                     |                                    |       |
| Module Type                        | Core                              |            | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                    |       |
| Module Code                        | AIC1104                           |            |                                                                                                                                                                                                                                                     |                                    |       |
| ECTS Credits                       | 5                                 |            |                                                                                                                                                                                                                                                     |                                    |       |
| SWL (hr/sem)                       | 125                               |            |                                                                                                                                                                                                                                                     |                                    |       |
| Module Level                       |                                   | UGI        | Semester of Delivery                                                                                                                                                                                                                                |                                    | 1     |
| Administering Department           |                                   | Big Data   | College                                                                                                                                                                                                                                             | College of Artificial Intelligence |       |
| Module Leader                      | Dr.Noor Redha Abd Alrazak Alkazaz |            | e-mail                                                                                                                                                                                                                                              | noor.alkazaz@cs.w.uobaghdad.edu.iq |       |
| Module Leader’s Acad. Title        |                                   | Lecturer   | Module Leader’s Qualification                                                                                                                                                                                                                       |                                    | Ph.D. |
| Module Tutor                       | Name (if available)               |            | e-mail                                                                                                                                                                                                                                              | E-mail                             |       |
| Peer Reviewer Name                 |                                   | Name       | e-mail                                                                                                                                                                                                                                              | E-mail                             |       |
| Scientific Committee Approval Date |                                   | 25/10/2025 | Version Number                                                                                                                                                                                                                                      | 1.0                                |       |

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



## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

#### Module Objectives

أهداف المادة الدراسية

- Introduce the fundamental concepts, history, and goals of Artificial Intelligence (AI).
- Understand basic AI concepts.
- Develop an understanding of AI technologies and their history.
- Understand AI applications in various technologies and fields.
- Understand future AI trends.
- Describe and understand the definition and types of machine learning.
- Introduce and understand key knowledge points of machine learning.
- Introduce common machine learning algorithms to help better understand their functions and usages.
- Master the implementation process of machine learning algorithms.

#### Module Learning Outcomes

مخرجات التعلم للمادة الدراسية

- Define and explain the fundamental concepts, history, and components of Artificial Intelligence.
- Use Python programming to implement machine learning algorithms and problem-solving techniques relevant to AI foundations.
- Describe the principles of machine learning, NLP, and computer vision, and relate them to real-world applications.
- Provide insights into the application fields and future of AI technologies based on their definition and scope.
- Analyze ethical and societal challenges related to the design and deployment of AI systems.
- Define and explain the fundamental concepts of machine learning.
- Describe machine learning process and its key knowledge points.
- Describe common machine learning algorithms to help better understand their functions and usages.



|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | <ul style="list-style-type: none"><li>Demonstrate teamwork, communication, and reflective learning through lab-based and mini-project activities.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Indicative Contents</b><br>المحتويات الإرشادية | <ul style="list-style-type: none"><li>Introduction to AI: Definition, history, goals, applications, and intelligent agents.</li><li>Machine Learning: Basic concepts of data-driven learning; supervised and unsupervised learning.</li><li>Natural Language Processing: Understanding and generating human language.</li><li>Computer Vision: Basic image understanding and recognition.</li><li>Ethics and Responsible AI.</li><li>Python for AI: Data structures, functions, libraries, machine learning algorithms.</li><li>Practical Integration: Mini-project combining AI concepts with Python programming.</li></ul> |

| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b>                                                      | <ul style="list-style-type: none"><li>Lectures (2 hrs/week): Deliver theoretical concepts through interactive presentations and discussions.</li><li>Laboratory Sessions (2 hrs/week): Provide guided practical exercises using Python to apply theory to AI problems.</li><li>Case Studies and Ethical Debates: Encourage critical thinking through real-world examples.</li><li>Mini Projects and Group Work: Promote collaboration and creativity through small-scale AI models or prototypes.</li><li>Formative Assessment and Feedback: Include quizzes, reports, and peer feedback to enhance learning.</li></ul> |



### Student Workload (SWL)

الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

|                                                                                |     |                                                                           |      |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|------|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 78  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 5:12 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 47  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3:08 |
| <b>Total SWL (h/sem)</b><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         | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                      | Assignments     | 1           | 10% (10)         | 11         | LO #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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  | The Concept of Artificial Intelligence                                           |
| Week 2  | The Technologies of AI                                                           |
| Week 3  | The Applications of AI                                                           |
| Week 4  | The Controversy of AI                                                            |
| Week 5  | The Development Trends for AI                                                    |
| Week 6  | Introduction to Machine Learning                                                 |
| Week 7  | Types of Machine Learning                                                        |
| Week 8  | Midterm                                                                          |
| Week 9  | The Overall Process of Machine Learning: Data Collection and Cleaning            |
| Week 10 | Data Conversion and Feature Selection                                            |
| Week 11 | Model Evaluation                                                                 |
| Week 12 | Common Algorithms of Machine Learning: Linear Regression and Logistic Regression |
| Week 13 | Decision Tree and Support Vector Machine                                         |
| Week 14 | k-Nearest Neighbors Algorithm                                                    |
| Week 15 | Naive Bayes and Clustering Algorithm                                             |
| Week 16 | Case Study                                                                       |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر



|        | Material Covered                        |
|--------|-----------------------------------------|
| Week 1 | Lab 1: AI simulator                     |
| Week 2 | Lab 2: AI simulator                     |
| Week 3 | Lab 3: Linear Regression                |
| Week 4 | Lab 4: Logistic Regression              |
| Week 5 | Lab 5: Decision Tree                    |
| Week 6 | Lab 6: K-means Algorithm Implementation |
| Week 7 | Lab 7: Discussion the final project     |

### Learning and Teaching Resources

#### مصادر التعلم والتدريس

|                   | Text                                                                                                                                                                                       | Available in the Library? |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | Huawei Technologies Co., Ltd., (2023). <i>Artificial Intelligence Technology</i> . Springer. doi: 10.1007/978-981-19-2879-6                                                                |                           |
| Recommended Texts | Russell, S. J., & Norvig, P. (2021). <i>Artificial Intelligence: A Modern Approach</i> (4th ed.). Pearson.                                                                                 |                           |
| Websites          | <a href="https://link.springer.com/book/10.1007/978-981-19-2879-6">https://link.springer.com/book/10.1007/978-981-19-2879-6</a><br><a href="https://e.huawei.com">https://e.huawei.com</a> |                           |

### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade         | التقدير | Marks %  | Definition                     |
|-----------------------------|---------------|---------|----------|--------------------------------|
| Success Group<br>(50 - 100) | A - Excellent | امتياز  | 90 - 100 | Outstanding Performance        |
|                             | B - Very Good | جيد جدا | 80 - 89  | Above average with some errors |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                   |                  |                     |         |                                       |
|-------------------|------------------|---------------------|---------|---------------------------------------|
|                   | 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           |
| <b>Fail Group</b> | <b>FX – Fail</b> | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| <b>(0 – 49)</b>   | <b>F – Fail</b>  | 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.



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                  |            |                               |                                                                                                                                                                                                                                           |       |
|------------------------------------|------------------|------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| معلومات المادة الدراسية            |                  |            |                               |                                                                                                                                                                                                                                           |       |
| Module Title                       | CALCULUS         |            |                               | Module Delivery                                                                                                                                                                                                                           |       |
| Module Type                        | Core             |            |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> 6Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |       |
| Module Code                        | AIC1102          |            |                               |                                                                                                                                                                                                                                           |       |
| ECTS Credits                       | 6                |            |                               |                                                                                                                                                                                                                                           |       |
| SWL (hr/sem)                       | 150              |            |                               |                                                                                                                                                                                                                                           |       |
| Module Level                       |                  | 1          | Semester of Delivery          |                                                                                                                                                                                                                                           |       |
| Administering Department           |                  |            | College                       | Type College Code                                                                                                                                                                                                                         |       |
| Module Leader                      | WALEED KHAIRY    |            | e-mail                        | waleed.al.ashtari@coeng.uobaghdad.edu.iq                                                                                                                                                                                                  |       |
| Module Leader's Academic Title     |                  | Professor  | Module Leader's Qualification |                                                                                                                                                                                                                                           | Ph.D. |
| Module Tutor                       | AHMED ALHAMADANI |            | e-mail                        | AHMED@coeng.uobaghdad.edu.iq                                                                                                                                                                                                              |       |
| Peer Reviewer Name                 |                  | Name       | e-mail                        | E-mail                                                                                                                                                                                                                                    |       |
| Scientific Committee Approval Date |                  | 20/01/2026 | Version Number                |                                                                                                                                                                                                                                           | 1.0   |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى |      |          |  |
|------------------------------------------------------------------|------|----------|--|
| Prerequisite module                                              | None | Semester |  |
| Co-requisites module                                             | None | Semester |  |



## Module Objectives, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"><li>1. Basic Calculus Concepts: Introduce limits, derivatives, and integrals.</li><li>2. Problem-Solving Skills: Teach students how to use differential and integral calculus to solve problems.</li><li>3. Real-World Applications: Demonstrate how calculus is used in physics, engineering, and economics.</li><li>4. Preparation for Advanced Mathematics: Prepare students for more advanced math courses.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"><li>1. Limit Calculation: Compute limits and interpret the behavior of functions.</li><li>2. Differentiation: Determine rates of change and solve optimization problems.</li><li>3. Integration: Employ methods for calculating areas under curves and solving simple differential equations.</li><li>4. Mathematical Writing: Clearly express mathematical concepts in writing.</li><li>5. Critical Thinking: Analyze complex problems using calculus.</li></ol>                                                                                                                                                                                                                                                                                                         |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <ol style="list-style-type: none"><li>1. Introduction to Calculus: Overview of its history and real-life applications.</li><li>2. Understanding Limits and Continuity: Learn to evaluate limits and grasp continuity.</li><li>3. Differentiation Methods: Explore product, quotient, and chain rules.</li><li>4. Using Derivatives: Identify critical points, perform optimization, and analyze curves.</li><li>5. Integration Methods: Cover substitution, integration by parts, and basic integral calculations.</li><li>6. Fundamental Theorem of Calculus: Understand the relationship between differentiation and integration for calculating areas.</li><li>7. Applications of Integration: Calculate areas between curves and explore physical applications.</li><li>8. Introduction to Differential Equations: Learn the basics of solving simple differential equations for modelling purposes.</li></ol> |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                          |
|-------------------|------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <ol style="list-style-type: none"><li>1. Lectures on Effective Time Management</li></ol> |
|-------------------|------------------------------------------------------------------------------------------|



|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| الإستراتيجيات | <ul style="list-style-type: none"> <li>Conduct structured sessions emphasizing time management's critical role in academic and professional settings. These sessions will explore proven strategies for enhancing personal productivity, including task prioritization, overcoming procrastination, and using practical time-tracking tools.</li> <li>2. Collaborative Group Work <ul style="list-style-type: none"> <li>Implement group-based assignments to strengthen teamwork, communication, and collective problem-solving abilities. By promoting peer collaboration, the program enhances understanding and cultivates a shared commitment to achieving educational objectives.</li> </ul> </li> <li>3. Integration of Accessible Online Resources <ul style="list-style-type: none"> <li>Leverage user-friendly digital platforms and online courses to support ongoing skill development and reinforce course content. Provide access to a wide range of learning materials, ensuring flexible, independent learning and continuous ..engagement beyond the traditional classroom environment</li> </ul> </li> </ul> |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

|                                                                                 |     |                                                                            |   |
|---------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------|---|
| <b>Structured SWL (hr/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 63  | <b>Structured SWL (hr/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 4 |
| <b>Unstructured SWL (hr/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 87  | <b>Unstructured SWL (hr/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 3 |
| <b>Total SWL (hr/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 150 |                                                                            |   |

### 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 #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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 (Theoretical Weekly Syllabus)

#### المنهاج الاسبوعي النظري

|                | Material Covered                                                                                                                                |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Fundamental Number Theory and Inequalities<br>Overview of the properties of real numbers and principles of inequalities.                        |
| <b>Week 2</b>  | Intervals and Absolute Values<br>Study of interval notation and absolute values, as well as strategies for solving inequality problems.         |
| <b>Week 3</b>  | Coordinate Geometry and Inclination<br>Application of the Cartesian coordinate system and concepts of angle inclination in geometry.            |
| <b>Week 4</b>  | Functions<br>Definition, classification, and operations involving functions, including their domain and range.                                  |
| <b>Week 5</b>  | Properties of Limits<br>Examination of limits, basic limit laws, and their applications.                                                        |
| <b>Week 6</b>  | Continuity<br>Analysis of function continuity and criteria for assessing it.                                                                    |
| <b>Week 7</b>  | Mid-Term Examination and Discussion<br>Evaluation of material from Weeks 1 to 6 and a review session.                                           |
| <b>Week 8</b>  | Trigonometric Functions<br>Overview of trigonometric functions, their identities, and applications.                                             |
| <b>Week 9</b>  | Derivative Rules<br>Review differentiation rules for polynomials, exponential, and logarithmic functions.                                       |
| <b>Week 10</b> | Trigonometric Derivatives<br>Exploration of differentiation rules for trigonometric functions and their inverses.                               |
| <b>Week 11</b> | Applications of Derivatives<br>Introduction to L'Hôpital's Rule, understanding increasing and decreasing functions, and concavity.              |
| <b>Week 12</b> | Extreme Value and Mean Value Theorems<br>Discussion of essential calculus theorems related to real-world optimization.                          |
| <b>Week 13</b> | Integration<br>Overview of fundamental principles and techniques of integration.                                                                |
| <b>Week 14</b> | The First Fundamental Theorem of Calculus<br>An explanation of the relationship between integrals and derivatives is illustrated with examples. |
| <b>Week 15</b> | Review<br>Comprehensive review of all topics in preparation for the end-of-term assessment.                                                     |
| <b>Week 16</b> | Final Examination<br>A comprehensive assessment covering all topics from the course.                                                            |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|               | Material Covered                                          |
|---------------|-----------------------------------------------------------|
| <b>Week 1</b> | Lab 1: Introduction to Agilent VEE and PSPICE             |
| <b>Week 2</b> | Lab 2: Thévenin's / Norton's Theorem and Kirchhoff's Laws |
| <b>Week 3</b> | Lab 3: First-Order Transient Responses                    |
| <b>Week 4</b> | Lab 4: Second-Order Transient Responses                   |
| <b>Week 5</b> | Lab 5: Frequency Response of RC Circuits                  |
| <b>Week 6</b> | Lab 6: Frequency Response of RLC Circuits                 |
| <b>Week 7</b> | Lab 7: Filters                                            |

| Learning and Teaching Resources |                                                                                                                                                                                               |                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| مصادر التعليم والتعلم           |                                                                                                                                                                                               |                           |
|                                 | Text                                                                                                                                                                                          | Available in the Library? |
| <b>Required Texts</b>           | Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education                                                                                                     | Yes                       |
| <b>Recommended Texts</b>        | DC Electrical Circuit Analysis: A Practical Approach<br>Copyright Year: 2020, dissidents.                                                                                                     | No                        |
| <b>Websites</b>                 | <a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a> |                           |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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 with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



امسح الكود للوصول إلى النسخة الإلكترونية



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                             |                     |                               |                                                                                                                                                                                                                                                     |       |
|------------------------------------|-----------------------------|---------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| معلومات المادة الدراسية            |                             |                     |                               |                                                                                                                                                                                                                                                     |       |
| Module Title                       | Principles Big Data         |                     |                               | Module Delivery                                                                                                                                                                                                                                     |       |
| Module Type                        | Core                        |                     |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |       |
| Module Code                        | AIBD1101                    |                     |                               |                                                                                                                                                                                                                                                     |       |
| ECTS Credits                       | 4                           |                     |                               |                                                                                                                                                                                                                                                     |       |
| SWL (hr/sem)                       | 100                         |                     |                               |                                                                                                                                                                                                                                                     |       |
| Module Level                       |                             | 1                   | Semester of Delivery          |                                                                                                                                                                                                                                                     | 1     |
| Administering Department           |                             | Type Dept. Code     | College                       | Type College Code                                                                                                                                                                                                                                   |       |
| Module Leader                      | Loay Edward George          |                     | e-mail                        | E-mail                                                                                                                                                                                                                                              |       |
| Module Leader's Academic Title     |                             | Assistant Professor | Module Leader's Qualification |                                                                                                                                                                                                                                                     | Ph.D. |
| Module Tutor                       | Asst. Prof. Basad Al-Sarray |                     | e-mail                        | E-mail                                                                                                                                                                                                                                              |       |
| Peer Reviewer Name                 |                             | Name                | e-mail                        | E-mail                                                                                                                                                                                                                                              |       |
| Scientific Committee Approval Date |                             | 01/06/2023          | Version Number                |                                                                                                                                                                                                                                                     | 1.0   |

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



## Module Objectives, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"><li>1. To introduce fundamental concepts of data types, structures, and representation in the context of Big Data.</li><li>2. To explore the technological infrastructure and platforms used for Big Data processing.</li><li>3. To develop skills in data analysis, visualization, and similarity measurement.</li><li>4. To provide hands-on experience with Big Data tools and platforms.</li><li>5. To understand the 5V's and characteristics of Big Data.</li><li>6. To prepare students for real-world Big Data projects and applications.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"><li>1. Define and differentiate between structured, semi-structured, and unstructured data.</li><li>2. Explain the 5V's of Big Data and their implications.</li><li>3. Describe key Big Data platforms such as Hadoop, Spark, and cloud services.</li><li>4. Apply statistical and string-based feature extraction methods.</li><li>5. Use similarity measures such as Euclidean, Cosine, and Jaccard in data analysis.</li><li>6. Demonstrate basic proficiency with data analysis tools like Excel, R, and Python libraries.</li><li>7. Discuss the architecture and components of Hadoop.</li><li>8. Identify appropriate data formats and file structures for different data types.</li><li>9. Analyze and visualize data using appropriate tools and techniques.</li><li>10. Plan and execute a small-scale Big Data project..</li></ol>                                                                                                                                                                                                                                                          |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <p>Part A – Foundations of Big Data</p> <ul style="list-style-type: none"><li>• Data Fundamentals – Data types, representation, formats, and structures. Introduction to qualitative vs. quantitative data, measurement scales, and collection methods. [SSWL=12 hrs]</li><li>• IT for Big Data – Compression techniques, text, video, image, audio, XML, and HTML file formats. Overview of servers, programming languages, and their relevance to Big Data. [SSWL=10 hrs]</li><li>• Introduction to Big Data – Data size units, major sources of Big Data, structured, semi-structured, and unstructured data types. Current size, traffic, and projections of Big Data. [SSWL=8 hrs]</li></ul> <p>Part B – Big Data Characteristics and Platforms</p> <ul style="list-style-type: none"><li>• The 5V's and Features of Big Data – Volume, Velocity, Variety, Veracity, Value. Additional characteristics such as variability and complexity. [SSWL=8 hrs]</li><li>• Big Data Platforms – Part 1 – Overview of Hadoop, Spark, NoSQL, HBase, Cassandra, Amazon Web Services (AWS), Google Cloud Platform (GCP). [SSWL=12 hrs]</li></ul> |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>Big Data Platforms – Part 2 – Microsoft Azure, Apache Flink, Apache Kafka, IBM Cloud, Splunk, Elasticsearch. [SSWL=10 hrs]</li> </ul> <p>Part C – Big Data Architecture and Analysis</p> <ul style="list-style-type: none"> <li>Hadoop Architecture – Key components: HDFS, MapReduce, YARN. Stages: Data ingestion, job submission, Map and Reduce phases. Components: NameNode, DataNode, ResourceManager, NodeManager. Advantages, scalability, flexibility, cost-effectiveness, and challenges. [SSWL=14 hrs]</li> <li>Data Features and Statistics – Statistical features: histogram, probability, PDF, mean, median, mode, standard deviation. String features: length, digital signature. [SSWL=10 hrs]</li> <li>Similarity Measures – Manhattan, Euclidean, Cosine, Jaccard, Minkowski, Dice, Hamming, Pearson distances. Covariance and correlation coefficient. [SSWL=10 hrs]</li> </ul> <p>Part D – Tools and Applications</p> <ul style="list-style-type: none"> <li>Data Analytics Tools – Excel for data analysis, R analytic tool, Python libraries: Pandas, NumPy, Matplotlib. [SSWL=12 hrs]</li> <li>Review Sessions and Project Work – Review 1 (Unit 6) and Review 2 (Unit 13). Project discussion, planning, and implementation. [SSWL=14 hrs]</li> </ul> <p>Total hrs = 110 = SSWL - (Exam hrs) = 114 - 4 = 110 hr (Time table hrs × 15 weeks)</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Learning and Teaching Strategies            |                                                                                                                                                                                                                                             |                                          |     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----|
| استراتيجيات التعلم والتعليم                 |                                                                                                                                                                                                                                             |                                          |     |
| Strategies                                  | The main strategy is to encourage active participation through hands-on labs, interactive tutorials, and project-based learning. Students will engage with real datasets and tools such as Hadoop, Python, and R to build practical skills. |                                          |     |
| الإستراتيجيات                               |                                                                                                                                                                                                                                             |                                          |     |
| Student Workload (SWL)                      |                                                                                                                                                                                                                                             |                                          |     |
| الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا      |                                                                                                                                                                                                                                             |                                          |     |
| Structured SWL (hr/sem)                     | 64                                                                                                                                                                                                                                          | Structured SWL (hr/w)                    | 4.3 |
| الحمل الدراسي المنتظم للطالب خلال الفصل     |                                                                                                                                                                                                                                             | الحمل الدراسي المنتظم للطالب أسبوعيا     |     |
| Unstructured SWL (hr/sem)                   | 36                                                                                                                                                                                                                                          | Unstructured SWL (hr/w)                  | 2.4 |
| الحمل الدراسي غير المنتظم للطالب خلال الفصل |                                                                                                                                                                                                                                             | الحمل الدراسي غير المنتظم للطالب أسبوعيا |     |
| Total SWL (hr/sem)                          | 100                                                                                                                                                                                                                                         |                                          |     |
| الحمل الدراسي الكلي للطالب خلال الفصل       |                                                                                                                                                                                                                                             |                                          |     |



### 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 #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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 (Theoretical Weekly Syllabus)

#### المنهاج الاسبوعي النظري

|         | Material Covered                                          |
|---------|-----------------------------------------------------------|
| Week 1  | Data Types, Representation, Formats, Structures           |
| Week 2  | IT Foundations – Compression, File Formats, Servers       |
| Week 3  | Data Types – Qualitative/Quantitative, Measurement Scales |
| Week 4  | Intro to Big Data – Size, Sources, Structure Types        |
| Week 5  | 5V's and Other Features of Big Data                       |
| Week 6  | Big Data Platforms – Hadoop, Spark, NoSQL, AWS, GCP       |
| Week 7  | Midterm Exam                                              |
| Week 8  | Platforms Continued – Azure, Kafka, Flink, IBM Cloud      |
| Week 9  | Hadoop Architecture – HDFS, MapReduce, YARN               |
| Week 10 | Data Features – Statistical & String Features             |
| Week 11 | Similarity Measures – Euclidean, Cosine, Jaccard, etc.    |
| Week 12 | Data Analytics Tools – Excel, R, Python Libraries         |
| Week 13 | Exam (Quiz)                                               |
| Week 14 | Project Submission and Discussion                         |
| Week 15 | Preparing for Final Exam                                  |
| Week 16 | Final Exam                                                |



### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

|                | Material Covered                                                                                                                                                         |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b>  | Basics in Data – Definitions, types (Traditional vs. Big), examples from daily life. Explore personal data traces (phone usage, YouTube history).                        |
| <b>Week 2</b>  | 5 Vs of Big Data – Volume, Velocity, Variety, Veracity, Value. Identify real-world examples. Case studies: healthcare, e-commerce, transportation, climate, Google Maps. |
| <b>Week 3</b>  | How Big Data Is Stored – Data centers, cloud storage, distributed systems. Examples: Google Cloud, AWS.                                                                  |
| <b>Week 4</b>  | Working with Tables – Rows, columns, relationships. Create simple data tables in Excel/Google Sheets. Calculate basic statistics.                                        |
| <b>Week 5</b>  | Introduction to Databases & Data Analytics – What is a database? From raw data to insights. Descriptive statistics: mean, median, trend.                                 |
| <b>Week 6</b>  | Visualizing Data – Importance of visualization, chart types (bar, line, pie, heatmap). Create charts from sample datasets (student survey data).                         |
| <b>Week 7</b>  | Midterm Exam (No Lab)                                                                                                                                                    |
| <b>Week 8</b>  | Big Data Technologies – Overview of Hadoop, Spark, NoSQL. Demonstration videos + interactive diagram drawing.                                                            |
| <b>Week 9</b>  | Cloud and IoT – How data is collected from devices/sensors. Examples: smart homes, cars. Hands-on IoT simulation using online dashboards.                                |
| <b>Week 10</b> | AI and Big Data – How AI uses Big Data for predictions. Examples: ChatGPT, recommendation systems. Interactive activity: How Netflix or TikTok recommends content.       |
| <b>Week 11</b> | Data-Driven Decision Making – How companies/governments make evidence-based decisions. Analyze datasets (COVID-19, population, weather) visually.                        |
| <b>Week 12</b> | Mini Project – Group project development: creating a data story or dashboard. Prepare project poster or presentation slides.                                             |
| <b>Week 13</b> | Project Presentation – Part 1. Group presentations and peer feedback.                                                                                                    |
| <b>Week 14</b> | Project Presentation – Part 2. Showcase and evaluation.                                                                                                                  |
| <b>Week 15</b> | Final Exam                                                                                                                                                               |

### Learning and Teaching Resources

#### مصادر التعليم والتعلم

|                          | Text                                                     | Available in the Library? |
|--------------------------|----------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Big Data: Principles and Best Practices (Latest Edition) | Yes                       |
| <b>Recommended Texts</b> | Hadoop: The Definitive Guide (O'Reilly)                  | No                        |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



Websites

Coursera (coursera.org) | Apache Hadoop (hadoop.apache.org)

Grading Scheme

مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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 with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



امسح الكود للوصول إلى النسخة الإلكترونية



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                     |                    |                                                                                                                                                                                                                                          |                              |      |
|------------------------------------|---------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------|
| معلومات المادة الدراسية            |                     |                    |                                                                                                                                                                                                                                          |                              |      |
| Module Title                       | English 1           |                    | Module Delivery                                                                                                                                                                                                                          |                              |      |
| Module Type                        | Basic               |                    | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                              |      |
| Module Code                        | UOB102              |                    |                                                                                                                                                                                                                                          |                              |      |
| ECTS Credits                       | 2                   |                    |                                                                                                                                                                                                                                          |                              |      |
| SWL (hr/sem)                       | 50                  |                    |                                                                                                                                                                                                                                          |                              |      |
| Module Level                       |                     | UG1                | Semester of Delivery                                                                                                                                                                                                                     |                              | 1    |
| Administering Department           |                     | AIBD               | College                                                                                                                                                                                                                                  | AIC                          |      |
| Module Leader                      | Anfal Mudhafar Ali  |                    | e-mail                                                                                                                                                                                                                                   | anfal.m@csu.uobaghdad.edu.iq |      |
| Module Leader’s Academic Title     |                     | Lecturer assistant | Module Leader’s Qualification                                                                                                                                                                                                            |                              | M.A. |
| Module Tutor                       | Name (if available) |                    | e-mail                                                                                                                                                                                                                                   | E-mail                       |      |
| Peer Reviewer Name                 |                     | Name               | e-mail                                                                                                                                                                                                                                   | E-mail                       |      |
| Scientific Committee Approval Date |                     |                    | Version Number                                                                                                                                                                                                                           | 1.0                          |      |

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



## Module Objectives, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | 1- The program aims to enable students to understand, write, comprehend and speak English in a way that allows them to interact with English speakers.<br>2- In addition, it aims to improve the students reading and writing skills in the language of scientific research, in a way that enables them to pursue the latest research and discoveries in discreet international journals, as well as it qualifies them to communicate with their peers in international universities through English language.                                                                                                    |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | At the end of the semester, the student will be able to<br>1. Apply grammatical rules of English accurately in both written and spoken communication.<br>2. Demonstrate proficiency in reading comprehension, speaking, listening, and writing skills through various academic and practical tasks.<br>3. Communicate effectively in English by engaging in conversations, expressing ideas clearly, and adapting language appropriately to different audiences and contexts.<br>4. Compose well-structured written texts that are coherent, persuasive, and appropriate for their intended purpose and audience. |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | Indicative content includes the following.<br>Introduction to English tenses, grammar [7 hrs]<br>Using the present and past tenses and the differences between them [7 hrs]<br>How to write the English sentence. Types of sentences [4 hrs]<br>How to read aloud and the skills of comprehension and how to organize the ideas to answer reading questions. [7 hrs]<br>Revision problem classes [5 hrs]<br>Total hrs = 33 = SSWL - (Exam hrs) = 33 - 3 = 30 hr (Time table hrs x 15 weeks)                                                                                                                       |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b><br>الاستراتيجيات | Students are taught through communicative approach through which they are encouraged to speak even if they make mistakes.<br>1. Interactive Lectures: Using visual tools such as slides, videos, and records<br>2. Problem-Based Learning (PBL): a linguistic question is presented, requiring students to analyze it according to what they understood from the lecture. This method is used to enhance creative thinking technique for students and generate new ideas to solve problems through spontaneous contributions (brainstorming).<br>3. Blended Learning: Combining e-learning techniques with traditional education by using remote learning platforms where students can access lectures materials, additional learning materials, and submit assignments online. |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ol style="list-style-type: none"> <li>Self-Assessment and Feedback: Encouraging students to assess their colleague's performance through continuous feedback from the instructor, to enhance self-critique and personal analysis skills.</li> <li>Collaborative Learning: Using teamwork as an educational strategy through small groups to solve linguistics problems, fostering social interaction and developing communication skills</li> <li>Project-Based Learning: Offering students the chance to work on long-term projects that require research, preparing information in an organized well written report, and presenting their work in front of their class to enhance their speaking abilities. These projects can be individual or group-based, enhancing research and teamwork skills</li> </ol> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Student Workload (SWL)                                                          |    |                                                                            |     |
|---------------------------------------------------------------------------------|----|----------------------------------------------------------------------------|-----|
| الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا                                          |    |                                                                            |     |
| <b>Structured SWL (hr/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 33 | <b>Structured SWL (hr/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 2.2 |
| <b>Unstructured SWL (hr/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 17 | <b>Unstructured SWL (hr/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 1.1 |
| <b>Total SWL (hr/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 50 |                                                                            |     |

| Module Evaluation     |                          |             |                  |            |                           |
|-----------------------|--------------------------|-------------|------------------|------------|---------------------------|
| تقييم المادة الدراسية |                          |             |                  |            |                           |
|                       |                          | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| Formative assessment  | Quiz                     | 2           | 10% (10)         | 5&9        | LO #1, #2 and #3          |
|                       | Assignments              | 4           | 5% (5)           | 3,5,8 &12  | LO #1, #2                 |
|                       | participation in lecture | 5           | 5% (4)           | Continuous | All                       |
|                       | Portfolio                | 1           | 10% (10)         | 13         | LO #2 & #3                |
|                       | Project                  | 1           | 10% (10)         | 9-15       | LO #3 & #4                |
| 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 verb <i>to Be</i> , Possessive, making plural nouns                |
| Week 2  | Present simple, Adverbs of frequency, adjectives, Question words,                  |
| Week 3  | Pronouns, this/that, there, indefinite & definite articles, Expression of quantity |
| Week 4  | Was/ were, Past simple, irregular verbs, Prepositions                              |
| Week 5  | <b>Quiz/</b> Modal verbs, have to, like & would like.                              |
| Week 6  | Present continuous, Present simple and Present continuous, Future plans.           |
| Week 7  | <b>Midterm/</b> Tenses, state verbs                                                |
| Week 8  | Future, adverbs.                                                                   |
| Week 9  | <b>Quiz/</b> Present perfect, The Passive                                          |
| Week 10 | Time clauses, Conditionals, Participles                                            |
| Week 11 | Present perfect continuous, verb Patterns, infinitives.                            |
| Week 12 | Past perfect, Noun phrases, Reflexive pronouns                                     |
| Week 13 | Reported Speech, Relative clauses                                                  |
| Week 14 | Project Presentation                                                               |
| Week 15 | Project Presentation                                                               |
| Week 16 | <b>Final</b>                                                                       |



## Learning and Teaching Resources

### مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                 | Available in the Library? |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | New Headway Plus by Liz and John Soras- Beginner, Oxford University Press.                                                                                           | Yes                       |
| <b>Recommended Texts</b> | English Grammar in Use by Raymond Murphy.                                                                                                                            | Yes                       |
| <b>Websites</b>          | <a href="https://elt.oup.com/student/headway/beg/">https://elt.oup.com/student/headway/beg/</a><br><a href="https://test-english.com/">https://test-english.com/</a> |                           |

## Grading Scheme

### مخطط الدرجات

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

**Note:** Marks with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



امسح الكود للوصول إلى النسخة الإلكترونية



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                       |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
|------------------------------------|-----------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                       |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
| Module Title                       | Critical Thinking     |                 | Module Delivery                                                                                                                                                                                                                                                                                  |                                                                                              |
| Module Type                        | Basic                 |                 | <div><input checked="" type="checkbox"/>Theory</div> <div><input checked="" type="checkbox"/>Lecture</div> <div><input checked="" type="checkbox"/>Lab</div> <div><input type="checkbox"/>Tutorial</div> <div><input type="checkbox"/>Practical</div> <div><input type="checkbox"/>Seminar</div> |                                                                                              |
| Module Code                        | AIC1103               |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
| ECTS Credits                       | 4                     |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
| SWL (hr/sem)                       | 100                   |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
| Module Level                       |                       |                 |                                                                                                                                                                                                                                                                                                  |                                                                                              |
| Administering Department           |                       | Type Dept. Code | College                                                                                                                                                                                                                                                                                          | Type College Code                                                                            |
| Module Leader                      | Faisel Ghazi Mohammed |                 | e-mail                                                                                                                                                                                                                                                                                           | <a href="mailto:faisel.mohammed@sc.uobaghdad.edu.iq">faisel.mohammed@sc.uobaghdad.edu.iq</a> |
| Module Leader's Acad. Title        |                       | Professor       | Module Leader's Qualification                                                                                                                                                                                                                                                                    |                                                                                              |
| Module Tutor                       |                       |                 | e-mail                                                                                                                                                                                                                                                                                           |                                                                                              |
| Peer Reviewer Name                 |                       |                 | e-mail                                                                                                                                                                                                                                                                                           | E-mail                                                                                       |
| Scientific Committee Approval Date |                       |                 | Version Number                                                                                                                                                                                                                                                                                   | 1.0                                                                                          |

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

| Module Aims, Learning Outcomes and Indicative Contents   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Module Objectives<br>أهداف المادة الدراسية               | <ol style="list-style-type: none"><li>1. The program aims to equip students with the ability to analyze information critically, enabling them to assess arguments and evidence effectively in various contexts.</li><li>2. Additionally, it seeks to enhance students' skills in articulating their thoughts clearly and logically, fostering the ability to engage in constructive dialogue and make informed decisions based on sound reasoning.</li></ol> |



|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"><li>1. At the end of the semester, the student will be familiar with essential principles of critical thinking and how to apply them in analyzing arguments and evaluating evidence.</li><li>2. At the end of the semester, the student will enhance their skills in identifying logical fallacies, constructing coherent arguments, and engaging in reasoned discussions.</li><li>3. The ability to approach problems analytically and creatively, enabling the student to formulate questions, assess information, and draw well-supported conclusions.</li><li>4. <input type="checkbox"/> Understanding the techniques for effective decision-making, including how to weigh options and consider the implications of various choices.</li></ol>                                                                                                                                                                     |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <p><b>Part A – Theory</b></p> <ul style="list-style-type: none"><li>• Introduction to Critical Thinking concepts and importance [7 hrs]</li><li>• Identifying arguments, premises, and conclusions; evaluating reasoning [7 hrs]</li><li>• Analyzing common logical fallacies and biases [4 hrs]</li><li>• Developing skills in questioning assumptions and evidence evaluation [7 hrs]</li><li>• Practice sessions and problem-solving workshops [5 hrs]</li></ul> <p><b>Part B - Practical</b></p> <ul style="list-style-type: none"><li>• Applying critical thinking to real-life scenarios and case studies [7 hrs]</li><li>• Group discussions and debates to practice argumentation skills [6 hrs]</li><li>• Exercises on identifying logical fallacies in media and texts [5 hrs]</li><li>• Problem-solving tasks requiring evidence-based decision making [6 hrs]</li><li>• Presentation of critical analysis on selected topics [6 hrs]</li></ul> |

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <p>Students are taught through an interactive approach that encourages open discussion and the exploration of diverse viewpoints.</p> <ol style="list-style-type: none"><li>1. Interactive Lectures: Utilizing multimedia tools such as presentations, videos, and discussions to engage students in critical analysis of topics.</li><li>2. Case Study Analysis: Presenting real-world scenarios that require students to evaluate information critically, fostering practical application of critical thinking skills.</li><li>3. Socratic Method: Encouraging dialogue through questioning, where students are prompted to think deeply and articulate their reasoning, enhancing their analytical abilities.</li><li>4. Reflective Writing: Assigning written reflections on readings and discussions to help students articulate their thought processes and engage in self-assessment of their reasoning.</li><li>5. Group Discussions: Facilitating small group discussions that allow students to share perspectives and challenge each other's viewpoints, promoting collaborative critical thinking.</li><li>6. Debate and Argumentation: Organizing structured debates on various topics to help students develop their argumentation skills and learn to defend their positions with logical reasoning.</li></ol> |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

|                                                                                |     |                                                                           |  |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|--|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 64  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       |  |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 36  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا |  |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 100 |                                                                           |  |

### 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 #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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 | <b>Introduction to Critical Thinking</b> <ul style="list-style-type: none"><li>• Introduction and motivation</li><li>• Definitions and origins</li><li>• Mental and behavioral traits</li><li>• Common cognitive biases</li><li>• Reading, argument, and evidence</li><li>• Real-world analysis</li></ul> Reading: - Critical Thinking Skills: Effective Analysis, Argument and Reflection , by: Stella Cottrell - @ 2024 , 4 <sup>th</sup> ed.. |



|         |                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 2  | <b>Rules for Constructing Logical Arguments</b> <ul style="list-style-type: none"> <li>General Rules for Good Arguments</li> <li>Examples and Statistics</li> <li>Arguing by Analogy</li> <li>From Short Argument to Full Essay</li> </ul> Reading: - Weston, A Rulebook for Arguments, Chapters 1–3.                                                                                                 |
| Week 3  | <b>Logic and Fundamentals of Reasoning</b> <ul style="list-style-type: none"> <li>Reasoning</li> <li>Inference</li> <li>Comparison of Reasoning and Inference</li> <li>Types of Inference</li> <li>Deductive and Inductive Logic</li> <li>Structure of Logical Arguments</li> <li>Common Logical Fallacies</li> </ul> Reading: - Critical Thinking in the Age of Artificial Intelligence, Chapter 1&2 |
| Week 4  | <b>Analyzing and Evaluating Arguments</b> <ul style="list-style-type: none"> <li>Argument Analysis</li> <li>Evaluation Criteria</li> <li>Evaluating Information Sources</li> <li>Applications in AI</li> <li>Advanced Skills and Practical Tips</li> <li>Real-World Case Studies</li> </ul> Reading: - Critical Thinking: Tools for Taking Charge of Your Professional and Personal Life              |
| Week 5  | <b>Cognitive and Data Biases</b> <ul style="list-style-type: none"> <li>Cognitive biases: confirmation bias, anchoring.</li> <li>Data and algorithmic biases.</li> </ul>                                                                                                                                                                                                                              |
| Week 6  | <b>Creative Thinking and Problem Solving</b> <ul style="list-style-type: none"> <li>Accuracy vs. Precision/Recall.</li> <li>Overfitting and Underfitting.</li> </ul> Reading: Absolute Essentials of Creative Thinking and Problem Solving" Tony Proctor                                                                                                                                              |
| Week 7  | <b>Midterm Exam and Review Lecture</b>                                                                                                                                                                                                                                                                                                                                                                |
| Week 8  | <b>Statistical Thinking and Decision-Making</b> <ul style="list-style-type: none"> <li>Statistical thinking Principles</li> <li>Probability and Uncertainty</li> </ul> Reading: Critical Thinking and Creative Analogies in Statistics, Science, and Technology Essential Skills for the AI Era                                                                                                       |
| Week 9  | <b>Statistical Thinking and Decision-Making</b> <ul style="list-style-type: none"> <li>Correlation and Casual</li> <li>Data – Driven Decision</li> </ul> Reading: Critical Thinking and Creative Analogies in Statistics, Science, and Technology Essential Skills for the AI Era                                                                                                                     |
| Week 10 | <b>Effective Communication</b> <ul style="list-style-type: none"> <li>The Logical Structure of Communication</li> </ul>                                                                                                                                                                                                                                                                               |



|                |                                                                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <b>Reading:</b> Paul, R & Elder, L. (2006). (Critical Thinking: Tools for Taking Charge of Your Learning and Your Life)                                                                                                                                    |
| <b>Week 11</b> | <b>Effective Communication</b> <ul style="list-style-type: none"> <li>Psychological Barriers to Effective Communication</li> </ul> <b>Reading:</b> Paul, R & Elder, L. (2006). (Critical Thinking: Tools for Taking Charge of Your Learning and Your Life) |
| <b>Week 12</b> | <b>Decisions Under Uncertainty</b> <ul style="list-style-type: none"> <li>Expected Utility.</li> <li>Value of Information.</li> </ul> <b>Reading:</b> Decision Making Under Uncertainty: Theory and Application                                            |
| <b>Week 13</b> | <b>Model Interpretation (Explainable AI)</b> <ul style="list-style-type: none"> <li>Basic principles of model interpretation.</li> <li>Limits of interpretation.</li> </ul> <b>Reading:</b> Interpretable Machine Learning** ↯ Christoph Molnar            |
| <b>Week 14</b> | <b>Ethics and Responsibility in AI</b> <ul style="list-style-type: none"> <li>Issues of privacy, transparency, and fairness.</li> <li>Principles of AI ethics.</li> </ul> <b>Reading:</b> The Ethics of Artificial Intelligence                            |
| <b>Week 15</b> | <b>Final Review + Project Presentations</b> <ul style="list-style-type: none"> <li>General review of questions and concepts.</li> <li>Open discussion.</li> </ul>                                                                                          |
| <b>Week 16</b> | <b>Final Exam</b>                                                                                                                                                                                                                                          |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي العملي

|               | Material Covered                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 1</b> | <b>Introduction to Critical Thinking - Practical Application</b> <ul style="list-style-type: none"> <li>Cognitive Bias Identification Exercise: Students analyze real-world examples (news articles, advertisements) to identify cognitive biases such as confirmation bias, anchoring bias, and availability heuristic</li> <li>Argument vs. Non-Argument Classification: Interactive exercises where students distinguish between arguments and mere assertions</li> <li>Group Discussion: Analyzing case studies demonstrating the importance of critical thinking in everyday decision-making</li> <li>Self-Assessment Tool: Students complete a critical thinking skills inventory to identify their baseline strengths and areas for development</li> </ul> |
| <b>Week 2</b> | <b>Constructing and Analyzing Arguments</b> <ul style="list-style-type: none"> <li>Argument Mapping Workshop: Students practice creating visual argument maps (premise-conclusion diagrams) for complex arguments from various sources</li> <li>Examples and Statistics Analysis: Evaluating the strength and relevance of examples</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                    |



|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <p>and statistical evidence in written arguments</p> <ul style="list-style-type: none"><li>- Analogy Construction Exercise: Students create and evaluate analogies, identifying strong vs. weak analogical reasoning</li><li>- Peer Review Activity: Students exchange short argumentative paragraphs and provide constructive feedback on logical structure</li><li>- Writing Exercise: Draft a short argument (250-300 words) on a given topic, applying rules from Weston's Rulebook</li></ul>                                                                                                                                                                                                                                                                                                                     |
| <b>Week 3</b> | <p><b>Logic Fundamentals - Hands-on Practice</b></p> <ul style="list-style-type: none"><li>- Deductive Reasoning Exercises: Solving syllogisms and identifying valid/invalid argument forms (Modus Ponens, Modus Tollens, etc.)</li><li>- Inductive Reasoning Practice: Analyzing patterns and making probabilistic inferences from data sets</li><li>- Logical Fallacy Hunt: Students examine opinion pieces, political speeches, or social media posts to identify and categorize common logical fallacies (ad hominem, straw man, false dilemma, slippery slope, etc.)</li><li>- Truth Tables Construction: Practicing formal logic through truth table exercises for basic logical operators</li><li>- Case Study Analysis: Evaluating the logical structure of arguments in AI-related ethical debates</li></ul> |
| <b>Week 4</b> | <p><b>Evaluating Arguments and Sources</b></p> <ul style="list-style-type: none"><li>- Source Credibility Assessment: Students evaluate multiple online sources on the same topic using CRAAP test (Currency, Relevance, Authority, Accuracy, Purpose)</li><li>- Fact-Checking Exercise: Using fact-checking tools and techniques to verify claims from news articles and social media</li><li>- AI-Generated Content Analysis: Identifying potential biases, inaccuracies, or limitations in AI-generated text</li><li>- Comparative Analysis: Students compare treatment of the same topic across different media outlets to identify bias and perspective</li><li>- Group Presentation Preparation: Begin working on critical analysis projects</li></ul>                                                          |
| <b>Week 5</b> | <p><b>Cognitive and Data Biases Workshop</b></p> <ul style="list-style-type: none"><li>- Cognitive Bias Simulation Games: Interactive activities demonstrating confirmation bias, anchoring effect, and availability heuristic</li><li>- Dataset Bias Detection: Students analyze real datasets to identify sampling bias, selection bias, and measurement bias</li><li>- Algorithmic Bias Case Studies: Examining documented cases of algorithmic bias (facial recognition, hiring algorithms, credit scoring)</li><li>- Debiasing Strategies Practice: Applying techniques to minimize cognitive biases in decision-making</li></ul>                                                                                                                                                                                |



|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ul style="list-style-type: none"><li>- Reflection Journal: Students document their own experiences with cognitive biases during the week</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Week 6</b> | <b>Creative Problem-Solving Workshop</b> <ul style="list-style-type: none"><li>- Brainstorming Session: Using structured techniques (mind mapping, SCAMPER, six thinking hats) to generate creative solutions</li><li>- Lateral Thinking Puzzles: Solving non-traditional problems requiring creative approaches</li><li>- Overfitting/Underfitting Exercise: Analyzing machine learning model performance scenarios and determining appropriate model complexity</li><li>- Precision vs. Recall Trade-offs: Practical exercises on balancing different performance metrics in AI systems</li><li>- Innovation Challenge: Students apply creative thinking to propose solutions for real-world problems</li><li>- Quiz 1 Review and Discussion</li></ul> |
| <b>Week 7</b> | <b>Midterm Exam</b> <ul style="list-style-type: none"><li>- Midterm Exam (Practical Component):<ul style="list-style-type: none"><li>- Argument analysis task</li><li>- Logical fallacy identification</li><li>- Source evaluation exercise</li><li>- Short essay applying critical thinking principles</li></ul></li><li>- Post-Exam Discussion: Review of common challenges and key learning points from Weeks 1-6</li></ul>                                                                                                                                                                                                                                                                                                                           |
| <b>Week 8</b> | <b>Statistical Thinking - Principles and Probability</b> <ul style="list-style-type: none"><li>- Descriptive Statistics Exercise: Students analyze real datasets, calculating and interpreting measures of central tendency and variability</li><li>- Probability Scenarios: Solving real-world probability problems (medical testing, risk assessment)</li><li>- Bayesian Reasoning Practice: Applying Bayes' theorem to update beliefs based on new evidence</li><li>- Uncertainty Quantification: Exercises on expressing and communicating uncertainty appropriately</li><li>- Data Visualization Critique: Evaluating the effectiveness and potential misleading aspects of various data visualizations</li></ul>                                   |
| <b>Week 9</b> | <b>Correlation, Causation, and Data-Driven Decisions</b> <ul style="list-style-type: none"><li>- Correlation Analysis: Using real datasets to calculate and interpret correlation coefficients</li><li>- Causation vs. Correlation Exercises: Analyzing scenarios to distinguish between</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <p>correlation and causation, identifying confounding variables</p> <ul style="list-style-type: none"> <li>- Experimental Design Workshop: Students design simple experiments to establish causal relationships</li> <li>- Data-Driven Decision Case Studies: Analyzing business/policy decisions based on data, identifying strengths and limitations</li> <li>- Simpson's Paradox Exploration: Interactive demonstration of how aggregated data can lead to misleading conclusions</li> <li>- Assignment 2 Review Session</li> </ul>                                                                                                                                                                                                                                                        |
| Week 10 | <p><b>Effective Communication - Logical Structure</b></p> <ul style="list-style-type: none"> <li>- Argument Structuring Workshop: Students practice organizing complex ideas into clear, logical presentations</li> <li>- Thesis Statement Development: Crafting strong, defensible thesis statements for argumentative essays</li> <li>- Counterargument Integration: Exercises on acknowledging and refuting opposing viewpoints effectively</li> <li>- Logical Flow Analysis: Students evaluate and improve the coherence and logical progression of sample texts</li> <li>- Presentation Skills Practice: Short individual presentations on course-related topics with peer feedback on logical structure</li> </ul>                                                                      |
| Week 11 | <p><b>Overcoming Communication Barriers</b></p> <ul style="list-style-type: none"> <li>- Active Listening Exercise: Paired activities focusing on understanding before responding</li> <li>- Assumption Identification: Students analyze their own and others' unstated assumptions in arguments</li> <li>- Emotional Reasoning Recognition: Identifying when emotions override logic in decision-making and communication</li> <li>- Framing Effects Demonstration: Interactive exercises showing how message framing influences interpretation</li> <li>- Difficult Conversations Role-Play: Practicing critical thinking in emotionally charged discussions</li> <li>- Reflective Writing: Students analyze a personal communication challenge through a critical thinking lens</li> </ul> |
| Week 12 | <p><b>Decision-Making Under Uncertainty</b></p> <ul style="list-style-type: none"> <li>- Expected Utility Calculations: Students solve decision problems using expected value and expected utility</li> <li>- Decision Trees Construction: Creating and analyzing decision trees for multi-stage decisions under uncertainty</li> <li>- Value of Information Analysis: Calculating how much it's worth to obtain additional</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |



|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <p>information before deciding</p> <ul style="list-style-type: none"> <li>- Risk Assessment Exercise: Evaluating different risk scenarios (medical, financial, environmental)</li> <li>- Monte Carlo Simulation Introduction: Simple simulation exercises to understand uncertainty in outcomes</li> <li>- Group Decision-Making Activity: Collaborative exercise demonstrating challenges in group decisions under uncertainty</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Week 13</b> | <p><b>Explainable AI and Model Interpretation</b></p> <ul style="list-style-type: none"> <li>- Black Box Model Exploration: Students interact with pre-trained machine learning models to understand their limitations in interpretability</li> <li>- Feature Importance Analysis: Using tools to identify which features most influence model predictions</li> <li>- LIME/SHAP Demonstrations: Hands-on practice with local interpretability methods</li> <li>- Ethical Implications Discussion: Case studies on consequences of using non-interpretable AI in high-stakes domains (healthcare, criminal justice)</li> <li>- Model Interpretation Presentation: Students present interpretations of a simple AI model's behavior</li> <li>- Project Report Guidelines and Workshop</li> </ul>                                                      |
| <b>Week 14</b> | <p><b>AI Ethics - Privacy, Transparency, and Fairness</b></p> <ul style="list-style-type: none"> <li>- Ethical Dilemma Analysis: Students analyze real-world AI ethics case studies (facial recognition, autonomous vehicles, algorithmic hiring)</li> <li>- Privacy Impact Assessment: Evaluating privacy implications of AI systems and data collection practices</li> <li>- Fairness Metrics Workshop: Understanding and calculating different definitions of algorithmic fairness</li> <li>- Transparency Audit: Students assess the transparency and explainability of AI systems in real applications</li> <li>- Ethical Framework Application: Applying different ethical frameworks (consequentialism, deontology, virtue ethics) to AI scenarios</li> <li>- Debate Session: Structured debate on controversial AI ethics topics</li> </ul> |
| <b>Week 15</b> | <ul style="list-style-type: none"> <li>• Present final projects + critical discussion.</li> <li>• Final assessment: Written report + presentation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Week 16</b> | <b>Final Exam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Learning and Teaching Resources



### مصادر التعلم والتدريس

|                   | Text                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Available in the Library? |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | <ol style="list-style-type: none"> <li>1. Stella Cottrell , "Critical Thinking Skills Effective analysis, argument and reflection", 4<sup>th</sup> edition , Bloomsbury Publishing Plc © Stella Cottrell 2023</li> <li>2. Paul, R., &amp; Elder, L. (2014). Critical Thinking: Tools for Taking Charge of Your Professional and Personal Life (2<sup>nd</sup> ed.). Pearson.</li> <li>3. Anthony Weston, "A Rulebook for Arguments", Copyright © 2017 by Hackett Publishing Company, Inc. (5<sup>th</sup> ed.).</li> <li>4. Daniel Kahneman , "Thinking, Fast and Slow", Copyright © 2011 by Daniel Kahneman.</li> <li>5. Cathy O'Neil, "Weapons of Math Destruction", Copyright © 2016 by Cathy O'Neil</li> <li>6. Gareth James • Daniela Witten • Trevor Hastie Robert Tibshirani, "An Introduction to Statistical Learning", © Springer Science+Business Media New York 2013 (Corrected at th printing 2017)</li> <li>7. Christoph Molnar , "Interpretable Machine Learning A Guide for Making Black Box Models Explainable", © 2022 Christoph Molnar, Germany, Munich.</li> </ol> | No                        |
| Recommended Texts | <ol style="list-style-type: none"> <li>1. Weston, A. (2018). A Rulebook for Arguments (5th ed.). Hackett Publishing.</li> <li>2. Kahneman, D. (2011). Thinking, Fast and Slow. Farrar, Straus and Giroux.</li> <li>3. O'Neil, C. (2016). Weapons of Math Destruction. Crown.</li> <li>4. Molnar, C. (2022). Interpretable Machine Learning: A Guide for Making Black Box Models Explainable. Leanpub.</li> <li>5. James, G., Witten, D., Hastie, T., &amp; Tibshirani, R. (2021). An Introduction to Statistical Learning with Applications in R (2nd ed.). Springer.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |
| Websites          | <ol style="list-style-type: none"> <li>1. Critical Thinking Community – Foundation for Critical Thinking: <a href="https://www.criticalthinking.org">https://www.criticalthinking.org</a></li> <li>2. Stanford Encyclopedia of Philosophy: Critical Thinking: <a href="https://plato.stanford.edu/entries/critical-thinking/">https://plato.stanford.edu/entries/critical-thinking/</a></li> <li>3. Interpretable Machine Learning Book – Christoph Molnar (online): <a href="https://christophm.github.io/interpretable-ml-book/">https://christophm.github.io/interpretable-ml-book/</a></li> <li>4. Partnership on AI – Resources for Responsible AI: <a href="https://partnershiponai.org/">https://partnershiponai.org/</a></li> </ol>                                                                                                                                                                                                                                                                                                                                           |                           |

### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade         | التقدير | Marks %  | Definition                     |
|-----------------------------|---------------|---------|----------|--------------------------------|
| Success Group<br>(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 |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد

بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                        |                  |                     |         |                                       |
|------------------------|------------------|---------------------|---------|---------------------------------------|
|                        | D - Satisfactory | متوسط               | 60 - 69 | Fair but with major shortcomings      |
|                        | E - Sufficient   | مقبول               | 50 - 59 | Work meets minimum criteria           |
| Fail Group<br>(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.



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                           |                 |                                                                                                                                                                                                                                                                                             |                              |                      |
|------------------------------------|---------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------|
| معلومات المادة الدراسية            |                           |                 |                                                                                                                                                                                                                                                                                             |                              |                      |
| Module Title                       | الديمقراطية وحقوق الانسان |                 | Module Delivery                                                                                                                                                                                                                                                                             |                              |                      |
| Module Type                        | Basic                     |                 | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input type="checkbox"/> Lab</div> <div><input type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div> |                              |                      |
| Module Code                        | UOB104                    |                 |                                                                                                                                                                                                                                                                                             |                              |                      |
| ECTS Credits                       | 2                         |                 |                                                                                                                                                                                                                                                                                             |                              |                      |
| SWL (hr/sem)                       | 50                        |                 |                                                                                                                                                                                                                                                                                             |                              |                      |
| Module Level                       |                           | UG1             |                                                                                                                                                                                                                                                                                             |                              | Semester of Delivery |
| Administering Department           |                           | Type Dept. Code | College                                                                                                                                                                                                                                                                                     | Type College Code            |                      |
| Module Leader                      | Dr.Zahraa H. Alsultani    |                 | e-mail                                                                                                                                                                                                                                                                                      | zahraa@cois.uobaghdad.edu.iq |                      |
| Module Leader’s Acad. Title        |                           | Lecturer        | Module Leader’s Qualification                                                                                                                                                                                                                                                               |                              | PH.D                 |
| Module Tutor                       | Name (if available)       |                 | e-mail                                                                                                                                                                                                                                                                                      | E-mail                       |                      |
| Peer Reviewer Name                 |                           | Name            | e-mail                                                                                                                                                                                                                                                                                      | E-mail                       |                      |
| Scientific Committee Approval Date |                           | 10/10/2025      | Version Number                                                                                                                                                                                                                                                                              |                              | 1.0                  |

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



## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"><li>1- ان يتعرف الطالب على مفهوم الديمقراطية وفكرة نشوءها في الحضارات القديمة وفي الفكر المعاصر</li><li>2- ان يتعلم الطالب خصائص الديمقراطية وانواعها واركانها وعلاقة الديمقراطية بالفكر الاسلامي</li><li>3- معرفة مفهوم حقوق الانسان ومكانة حقوق الانسان في المجتمع الدولي واعلانات حقوق الانسان العالمية وضمناناتها في الدستور العراقي النافذ</li><li>4- تعرف الطالب على كفالة حقوق الانسان والحريات العامة في القوانين والدساتير والمواثيق الدولية</li><li>5- ان يتعرف الطالب على تطور مفهوم حقوق الانسان وحرياته واجيال حقوق الانسان وفق الإعلان العالمي لحقوق الانسان والعهد الدولي.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <p>مخرجات البرنامج المطلوبة وطرائق التعليم والتعلم والتقييم</p> <p>أ- الاهداف المعرفية</p> <ol style="list-style-type: none"><li>1- معرفة فكرة الديمقراطية وتاريخ نشوءها وعلاقتها بالاسلام</li><li>2- التعرف على حقوق الانسان مفهومها ومضامينها وضمناناتها</li><li>3- ان يتعرف الطالب على الحريات العامة انواعها وضمناناتها في القوانين</li><li>4- معرفة موقف الاسلام من حقوق الانسان وكفالاته الحريات العامة</li><li>5- ان يتعرف الطالب على النصوص الضامنة للحقوق والحريات في الدستور العراقي النافذ</li><li>6- ان يتعرف الطالب على الادلة القرآنية في مجال ضمان حقوق الانسان والحريات العامة .</li></ol> <p>ب - الأهداف المهاراتية الخاصة بالبرنامج</p> <ol style="list-style-type: none"><li>1- ان يتعلم الطالب الدمج بين القوانين والمواثيق الدولية والاليات الوطنية والاجرائية في مجال الديمقراطية والحقوق</li><li>2- ان يتعلم الطالب مهارة استنتاج الحقوق الواجب ضمانها في القوانين</li><li>3- ان يتعلم الطالب الربط بين الديمقراطية وكفالة حقوق الانسان باعتبار الديمقراطية توفر النظام السياسي الذي تكفل فيه هذه الحقوق .</li></ol> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <p>تتضمن المحتويات الإرشادية ما يلي:</p> <ol style="list-style-type: none"><li>1- مفهوم حقوق الانسان والشرعة الدولية لحقوق الانسان. [ 7 ساعات ]</li><li>2- الاليات الوطنية لحقوق الانسان والاليات الاجرائية الرقابية والتوعوية لحقوق الانسان . [ 5 ساعات ]</li><li>3- مواثيق الشرعة الدولية لحقوق الانسان والاليات الوطنية والاجرائية لتطبيقها. [ 4 ساعات ]</li><li>4- الحقوق الفئوية والخاصة لحقوق الانسان. [ 7 ساعات ]</li><li>5- الديمقراطية- الأصول التاريخية وتطور المسارات. [ 7 ساعات ]</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|            |                                                                                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategies | 1- استخدام اساليب حديثة منها المحاضرات التفاعلية واستخدام أدوات بصرية كالعروض التقديمية والفيديوهات والتسجيلات.                                                                                 |
|            | 2- استنتاج مدى تطور مستوى تفكير الطلبة من خلال المناقشة معهم وفتح باب الحوار.                                                                                                                   |
|            | 3- طرح الاسئلة العامة على الطلبة وحثهم على التفكير والمشاركة                                                                                                                                    |
|            | 4- الاستعانة بالكتب الخارجية والمصطلحات العامة لتوصيل الاهداف المبتغاة.                                                                                                                         |
|            | 5- ملاحظة مدى توسع افاق تفكير الطلبة من خلال المناقشة اللاحقة لطرح المصطلحات والمفاهيم.                                                                                                         |
|            | 6- التعلم المدمج: دمج تقنيات التعلم الإلكتروني مع التعليم التقليدي باستخدام منصات التعلم عن بُعد، حيث يمكن للطلاب الوصول إلى مواد المحاضرات ومواد تعليمية إضافية، وتقديم الواجبات عبر الإنترنت. |
|            | 7- التقييم الذاتي والتغذية الراجعة: تشجيع الطلاب على تقييم أداء زملائهم من خلال التغذية الراجعة المستمرة لتعزيز مهارات النقد الذاتي والتحليل الشخصي.                                            |
|            | 8- التعلم التعاوني: استخدام العمل الجماعي كاستراتيجية تعليمية من خلال مجموعات صغيرة لحل المشكلات اللغوية، مما يعزز التفاعل الاجتماعي ويُثَمِّي مهارات التواصل.                                  |

## Student Workload (SWL)

### الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

|                                                                                |    |                                                                           |     |
|--------------------------------------------------------------------------------|----|---------------------------------------------------------------------------|-----|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 33 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 2.2 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 17 | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 1.1 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 50 |                                                                           |     |



### Module Evaluation

#### تقييم المادة الدراسية

|                      |                          | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|----------------------|--------------------------|-------------|------------------|------------|---------------------------|
| Formative assessment | Quiz                     | 1           | 10% (10)         | 9          | LO #1- #6                 |
|                      | Assignments              | 4           | 10% (10)         | 3,5,8 &12  | LO #1- #6                 |
|                      | participation in lecture | 5           | 10% (10)         | Continuous | All                       |
|                      | Project                  | 1           | 10% (10)         | 9-15       | LO #1- #6                 |
| Summative assessment | Midterm Exam             | 2hr         | 10% (10)         | 7          | LO #1- #6                 |
|                      | Final Exam               | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment     |                          |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

#### المناهج الاسبوعي النظري

|        | Material Covered                                                                                 |
|--------|--------------------------------------------------------------------------------------------------|
| Week 1 | معنى الحق، لغة- اصطلاحا- معنى الحق في القانون والمواثيق الدولية- حقوق الانسان والمواطنة          |
| Week 2 | انواع الحقوق<br>الحقوق المدنية-الحقوق السياسية- الحقوق الاقتصادية والاجتماعية والثقافية          |
| Week 3 | خصائص حقوق الانسان-تطور حقوق الانسان عبر المراحل التاريخية- حقوق الانسان في مرحلة العصور القديمة |
| Week 4 | حقوق الإنسان في العصور الوسطى.<br>- حقوق الإنسان في العصر الحديث.                                |
| Week 5 | Quiz                                                                                             |
| Week 6 | الاليات الوطنية والاجرائية لحقوق الانسان                                                         |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|         |                                                                                                                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 7  | Midterm                                                                                                                                                                                              |
| Week 8  | مفهوم الشرعة الدولية لحقوق الانسان. الإعلان العالمي لحقوق الانسان والقيمة القانونية له. العهد الدولي للحقوق المدنية والسياسية 1966 والعهد الدولي الخاص بالحقوق الاقتصادية والاجتماعية والثقافية 1966 |
| Week 9  | Quiz                                                                                                                                                                                                 |
| Week 10 | الحقوق الفئوية والخاصة. التمييز الإيجابي لصالح الفئات المستضعفة حقوق المرأة والطفل في المواثيق الدولية                                                                                               |
| Week 11 | الحقوق الفئوية والخاصة. حقوق ذوي الإعاقة والأقليات والاتفاقية الدولية للقضاء على جميع اشكال التمييز العنصري                                                                                          |
| Week 12 | الديمقراطية. المفاهيم التاريخية لنشأة الديمقراطية. أسس الديمقراطية الجذور التاريخية للديمقراطية                                                                                                      |
| Week 13 | تطور الديمقراطية في العصر الحديث                                                                                                                                                                     |
| Week 14 | المتلازمات المؤسسية للديمقراطية. الدستور المكتوب. الانتخابات الدورية. التداول السلمي للسلطة. الفصل بين السلطات. المتلازمات المجتمعية والسياسية للديمقراطية                                           |
| Week 15 | Project Presentation                                                                                                                                                                                 |
| Week 16 | Final                                                                                                                                                                                                |

## Learning and Teaching Resources

### مصادر التعلم والتدريس

|                   | Text                                                                                                                                                                                                                                                                                           | Available in the Library? |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | الكتاب الوزاري المنهجي لحقوق الانسان والديمقراطية، وزارة التعليم العالي والبحث العلمي، دائرة الدراسات والتخطيط والمتابعة                                                                                                                                                                       | Yes                       |
| Recommended Texts | د.رياض عزيز هادي- حقوق الانسان (تطورها، مضامينها، حمايتها)، كلية العلوم السياسية، جامعة بغداد 2006<br>1. د. حسان محمد شفيق العاني، نظرية الحريات العامة، تحليل ووثائق، كلية العلوم السياسية، جامعة بغداد 2004<br>2. د.حميد حنون خالد، الانظمة السياسية، (دارعائلك لصناعة الكتاب القاهرة، 2011) | Yes                       |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



Websites

١. بحث في آليات الديمقراطية وحماية حقوق الإنسان في العراق بعد ٢٠٠٣ على الرابط  
<https://www.iasj.net/iasj/article/173367>

Grading Scheme

مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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  |
|                             |                  |                     |          |                                       |

**ملاحظة:** سيتم تقريب العلامات العشرية التي تزيد أو تقل عن 0.5 إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة 54.5 إلى 55، بينما سيتم تقريب علامة 54.4 إلى 54). لدى الجامعة سياسة عدم التغاضي عن "العلامات التي تقترب من النجاح أو الرسوب"، لذا فإن التعديل الوحيد على العلامات التي منحها المصحح الأصلي سيكون التقريب التلقائي الموضح أعلاه.

2025-2026

Second Semester



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                             |            |                               |                                                                                                                                                                                                                                                                                                        |       |
|------------------------------------|-----------------------------|------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| معلومات المادة الدراسية            |                             |            |                               |                                                                                                                                                                                                                                                                                                        |       |
| Module Title                       | Data Structure for big data |            |                               | Module Delivery                                                                                                                                                                                                                                                                                        |       |
| Module Type                        | Core                        |            |                               | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input checked="" type="checkbox"/> Lab</div> <div><input type="checkbox"/> Tutorial</div> <div><input type="checkbox"/> Practical</div> <div><input type="checkbox"/> Seminar</div> |       |
| Module Code                        | AIBD1201                    |            |                               |                                                                                                                                                                                                                                                                                                        |       |
| ECTS Credits                       | 4                           |            |                               |                                                                                                                                                                                                                                                                                                        |       |
| SWL (hr/sem)                       | 100                         |            |                               |                                                                                                                                                                                                                                                                                                        |       |
| Module Level                       |                             | 1          | Semester of Delivery          |                                                                                                                                                                                                                                                                                                        | 1     |
| Administering Department           |                             | AIBD       | College                       | AIC                                                                                                                                                                                                                                                                                                    |       |
| Module Leader                      | Ahmad Hashim Hussein        |            | e-mail                        | ahmedhashem@pgiafs.uobaghdad.edu.iq                                                                                                                                                                                                                                                                    |       |
| Module Leader's Academic Title     |                             | Lecturer   | Module Leader's Qualification |                                                                                                                                                                                                                                                                                                        | Ph.D. |
| Module Tutor                       | Name (if available)         |            | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |       |
| Peer Reviewer Name                 |                             | Name       | e-mail                        | E-mail                                                                                                                                                                                                                                                                                                 |       |
| Scientific Committee Approval Date |                             | 01/02/2026 | Version Number                | 1.0                                                                                                                                                                                                                                                                                                    |       |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى |      |          |  |
|------------------------------------------------------------------|------|----------|--|
| Prerequisite module                                              | None | Semester |  |
| Co-requisites module                                             | None | Semester |  |



## Module Objectives, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ul style="list-style-type: none"><li>Getting to know the concept of data structures</li><li>Knowing the functions of data structures</li><li>Getting to know the application of data structures</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"><li>Understand the fundamental concepts of data structures and their importance in programming.</li><li>Learn about linear data structures such as arrays, linked lists, stacks, and queues.</li><li>Study non-linear data structures, including trees (binary trees, binary search trees, AVL trees, etc.) and graphs.</li><li>Analyze the time and space complexities of various data structure operations.</li><li>Implement data structures using programming languages and apply them to solve real-world problems.</li><li>Learn about algorithms for searching, sorting, and traversing data structures.</li></ol> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | Indicative content includes the following.<br>Introduction of data structures, type of data structures, Array - memory representation for 1D and 2D, linear list, stack operations, applications of stack, queue operations, applications of queue, circular queue, linked list, linked stack, linked queue.                                                                                                                                                                                                                                                                                                                                                |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                                    |                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b><br>الإستراتيجيات | 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, 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 ل ١٥ اسبوعا

|                         |    |                       |     |
|-------------------------|----|-----------------------|-----|
| Structured SWL (hr/sem) | 64 | Structured SWL (hr/w) | 4.3 |
|-------------------------|----|-----------------------|-----|



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



| الحمل الدراسي المنتظم للطالب خلال الفصل                                  |     | الحمل الدراسي المنتظم للطالب أسبوعياً                                |     |
|--------------------------------------------------------------------------|-----|----------------------------------------------------------------------|-----|
| Unstructured SWL (hr/sem)<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 36  | Unstructured SWL (hr/w)<br>الحمل الدراسي غير المنتظم للطالب أسبوعياً | 2.4 |
| Total SWL (hr/sem)<br>الحمل الدراسي الكلي للطالب خلال الفصل              | 100 |                                                                      |     |

| Module Evaluation<br>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 #3, #4 and #6, #7      |
|                                            | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                                            | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| Summative assessment                       | Midterm Exam    | 2hr         | 10% (10)         | 7          | LO #1 - #6                |
|                                            | Final Exam      | 3hr         | 50% (50)         | 16         | All                       |
| Total assessment                           |                 |             | 100% (100 Marks) |            |                           |

| Delivery Plan (Theoretical Weekly Syllabus)<br>المنهاج الاسبوعي النظري |                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                        | Material Covered                                                                                                                                                                                                                                                                                                         |
| Week 1                                                                 | <b>Introduction to Data Structures</b> <ul style="list-style-type: none"> <li>General Definitions</li> <li>Types of Data structure</li> <li>Difference between linear and Non-Linear Data Structure</li> <li>How to choose the suitable data structure</li> <li>The data structures are classified as follows</li> </ul> |
| Week 2                                                                 | <b>Variables and Algorithms</b> <ul style="list-style-type: none"> <li>Types of variables</li> <li>Algorithms Definition and Properties</li> </ul>                                                                                                                                                                       |



|        |                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <ul style="list-style-type: none"> <li>Format Convention for the algorithm</li> <li>Features of the algorithm</li> <li>Analyzing of the algorithm</li> <li>Example of the algorithm</li> </ul>                                                                                                                                                                                                           |
| Week 3 | <b>Linear Data Structures - Array</b> <ul style="list-style-type: none"> <li>Arrays with sequential allocation storage</li> <li>An array can also be defined as follows</li> <li>Funding number of Elements- 1D</li> <li>Funding number of cells- 1D</li> <li>Funding location -1D</li> <li>Funding number of Elements- 2D</li> <li>Funding number of cells- 2D</li> <li>Funding location -2D</li> </ul> |
| Week 4 | <b>Linear Data Structures - Stack</b> <ul style="list-style-type: none"> <li>Introduction</li> <li>Algorithms of Stack</li> <li>Algorithm to Insert a new element to the stack</li> <li>Algorithm to delete the top element of stack</li> <li>Algorithm "peep" to copy the ith element from the top of stack</li> <li>Algorithm to change an element in a stack</li> </ul>                               |
| Week 5 | <b>Linear Data Structures - Stack</b> <ul style="list-style-type: none"> <li>Applications of the stack.</li> <li>Questions for the stack.</li> <li>Remarks for the stack's work</li> <li>The general algorithm for converting any infix expression into suffix form</li> <li>Evaluating suffix expression</li> <li>Examples for the stack</li> </ul>                                                     |
| Week 6 | <b>Linear Data Structures – Queue</b> <ul style="list-style-type: none"> <li>Introduction</li> <li>Algorithms of Linear Queue</li> <li>Algorithm "insert"</li> <li>Algorithm "delete"</li> </ul>                                                                                                                                                                                                         |
| Week 7 | <b>Midterm Exam and Review Lecture</b>                                                                                                                                                                                                                                                                                                                                                                   |
| Week 8 | <b>Circular Queue</b> <ul style="list-style-type: none"> <li>Introduction</li> <li>Algorithms of Circular Queue</li> </ul>                                                                                                                                                                                                                                                                               |



|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <ul style="list-style-type: none"> <li>Algorithm "insert"</li> <li>Algorithm "delete"</li> <li>Deque (Double ended queue)</li> <li>Queue Applications</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Week 9  | <b>Statistical Linear List with dynamic allocation (linked Representation)</b> <ul style="list-style-type: none"> <li>Introduction</li> <li>List Representation</li> <li>Sequential list</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Week 10 | <b>Statistical Linear List with dynamic allocation (linked Representation)</b> <ul style="list-style-type: none"> <li>Linked list</li> <li>Available area and its operations</li> <li>Free List</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Week 11 | <b>Single Linked Linear List (S.L.L.L.)</b> <ul style="list-style-type: none"> <li>introduction</li> <li>With each insertion, need node</li> <li>With each Deletion return area</li> <li>With each insertion, need node</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Week 12 | <b>Single Linked Linear List (S.L.L.L.)</b> <ul style="list-style-type: none"> <li>Algorithm Create S.L.L.L.</li> <li>With each insertion, need node</li> <li>With deletion case</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Week 13 | <b>Single Linked Linear List (S.L.L.L.)</b> <ul style="list-style-type: none"> <li>Insert a new node to a single linked linear list</li> <li>Insert at the beginning of the list (Insertion to the list as stack)</li> <li>Insert at the middle of the list</li> <li>Insert at the end of the list (Insertion to the list as queue)</li> </ul>                                                                                                                                                                                                                                                                                                                                |
| Week 14 | <b>Circular Linked Linear List (C.L.L.L.)</b> <ul style="list-style-type: none"> <li>Advantage and Disadvantages</li> </ul> <b>Double Linked Linear List (D.L.L.L.)</b> <ul style="list-style-type: none"> <li>Creation the Doubly linked Linear list (add a new node to empty list)</li> <li>Insertion to the Double Linked List</li> <li>Deletion from the Double Linked List</li> </ul> <b>Double Linked List as Queue</b> <ul style="list-style-type: none"> <li>The insertion is after Rear node (the same as the insertion at the right most)</li> <li>The deletion is from Front node</li> </ul> <b>Comparison between Single Linked List and Circular Linked List</b> |



|         |                                                                            |
|---------|----------------------------------------------------------------------------|
|         | Comparison between Single Linked List and Double Linked List               |
| Week 15 | Present final projects.<br>Final assessment: Written report + presentation |
| Week 16 | Preparatory week before the final Exam                                     |

### Delivery Plan (Weekly Lab. Syllabus)

#### المناهج الاسبوعي للمختبر

|         | Material Covered                                                           |
|---------|----------------------------------------------------------------------------|
| Week 1  | Linear Data Structures - Array<br>- Introduction                           |
| Week 2  | Linear Data Structures - Array<br>- Sorting an array                       |
| Week 3  | Linear Data Structures - Array<br>- Arrays 1D and 2D                       |
| Week 4  | Linear Data Structures - Stack                                             |
| Week 5  | Linear Data Structures - Stack                                             |
| Week 6  | Linear Data Structures – Queue                                             |
| Week 7  | Midterm Exam                                                               |
| Week 8  | Linear Data Structures – Queue                                             |
| Week 9  | Circular Queue                                                             |
| Week 10 | Statistical Linear List with dynamic allocation (linked Representation)    |
| Week 11 | Statistical Linear List with dynamic allocation (linked Representation)    |
| Week 12 | Single Linked Linear List (S.L.L.L.)                                       |
| Week 13 | Circular Linked Linear List (C.L.L.L.)                                     |
| Week 14 | Double Linked Linear List (D.L.L.L.)                                       |
| Week 15 | Present final projects.<br>Final assessment: Written report + presentation |
| Week 16 | Final Exam                                                                 |

### Learning and Teaching Resources

#### مصادر التعليم والتعلم

|  | Text | Available in |
|--|------|--------------|
|--|------|--------------|



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                          |                                                                                                                                                                                                                                                                                                                                                                    | the Library? |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Required Texts</b>    | 1. Michael McMillan, "Data Structures and Algorithms Using C#", 2007.<br>2. Thomas H. Corman, Charles E. Leiserson "Introduction to Algorithms", 2009.<br>3. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures using C and C++, Prentice-Hall<br>4. Nell Dale, Chip Weems Tim Richards, C++ Plus Data Structures, Jones and Bartlet, Inc. | Yes          |
| <b>Recommended Texts</b> | Wengrow, J. (2020). A common-sense guide to data structures and algorithms: level up your core programming skills. O'Reilly Media; 2nd edition (1 Sept. 2020, ISBN-10: 1680507222, ISBN-13: 978-1680507225).                                                                                                                                                       | No           |
| <b>Websites</b>          | <a href="https://tutorialink.com/ds/">https://tutorialink.com/ds/</a><br><a href="https://www.tutorialspoint.com/data_structures_algorithms/index.htm">https://www.tutorialspoint.com/data_structures_algorithms/index.htm</a>                                                                                                                                     |              |

| Grading Scheme<br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |                     |          |                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Grade                   | التقدير             | Marks %  | Definition                            |
| <b>Success Group<br/>(50 - 100)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>A - Excellent</b>    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>B - Very Good</b>    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>C - Good</b>         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>D - Satisfactory</b> | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>E - Sufficient</b>   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 - 49)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>FX – Fail</b>        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>F – Fail</b>         | راسب                | (0-44)   | Considerable amount of work required  |
| <p><b>Note:</b> Marks with 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.</p> <p>ملاحظة: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠.٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤.٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤.٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.</p> |                         |                     |          |                                       |



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                             |          |                                                                                                                                                                                                                                                     |                                    |       |
|------------------------------------|-----------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------|
| معلومات المادة الدراسية            |                             |          |                                                                                                                                                                                                                                                     |                                    |       |
| Module Title                       | Object Oriented Programming |          | Module Delivery                                                                                                                                                                                                                                     |                                    |       |
| Module Type                        | Core                        |          | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                    |       |
| Module Code                        | AICI201                     |          |                                                                                                                                                                                                                                                     |                                    |       |
| ECTS Credits                       | 8                           |          |                                                                                                                                                                                                                                                     |                                    |       |
| SWL (hr/sem)                       | 200                         |          |                                                                                                                                                                                                                                                     |                                    |       |
| Module Level                       |                             | 1        |                                                                                                                                                                                                                                                     | Semester of Delivery               | 2     |
| Administering Department           |                             | AIBD     | College                                                                                                                                                                                                                                             | AIC                                |       |
| Module Leader                      | Mohammed Al-Shammaa         |          | e-mail                                                                                                                                                                                                                                              | m.alshammaa@coeng.uobaghdad.edu.iq |       |
| Module Leader's Academic Title     |                             | Lecturer | Module Leader's Qualification                                                                                                                                                                                                                       |                                    | Ph.D. |
| Module Tutor                       | Name (if available)         |          | e-mail                                                                                                                                                                                                                                              | E-mail                             |       |
| Peer Reviewer Name                 |                             | Name     | e-mail                                                                                                                                                                                                                                              | E-mail                             |       |
| Scientific Committee Approval Date |                             |          | Version Number                                                                                                                                                                                                                                      | 1.0                                |       |

| Relation with other Modules       |                          |          |   |
|-----------------------------------|--------------------------|----------|---|
| العلاقة مع المواد الدراسية الأخرى |                          |          |   |
| Prerequisite module               | Programming Fundamentals | Semester | 1 |
| Co-requisites module              | None                     | Semester |   |



| <b>Module Objectives, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                                | <ol style="list-style-type: none"><li>1. Understand the fundamental principles of object-oriented programming (OOP): encapsulation, inheritance, polymorphism, and abstraction.</li><li>2. Enable students to design and implement classes and objects to solve real-world computational problems.</li><li>3. Develop skills in applying OOP concepts using a modern programming language.</li><li>4. Build the ability to design reusable, maintainable, and extensible software systems.</li><li>5. Prepare students for advanced courses in software engineering, data structures, and applied AI systems that rely on OOP design.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                                 | <ol style="list-style-type: none"><li>1. Define and explain the four core principles of object-oriented programming: encapsulation, inheritance, polymorphism, and abstraction, with examples.</li><li>2. Compare and contrast procedural and object-oriented approaches to problem-solving, identifying when OOP is the appropriate paradigm.</li><li>3. Design classes and objects including attributes, methods, and access modifiers to model real-world entities and solve computational problems.</li><li>4. Implement encapsulation by using private/protected fields with appropriate getter/setter methods to protect data integrity.</li><li>5. Construct class hierarchies using inheritance to promote code reuse and represent "is-a" relationships.</li><li>6. Apply polymorphism (method overriding/overloading, interfaces, or abstract classes) to write flexible, extensible code.</li><li>7. Use abstraction to design simplified interfaces that hide implementation complexity from the end user.</li><li>8. Analyze a given problem statement and translate it into an appropriate object-oriented class design (e.g., via UML or class diagrams).</li><li>9. Evaluate the maintainability, reusability, and extensibility of a given OOP solution, identifying design improvements.</li><li>10. Develop small-to-medium software application that integrates all four OOP principles using a modern programming language (e.g. Python).</li><li>11. design decisions in OOP-based software, connecting them to broader software engineering practices (e.g., SOLID principles, design patterns) as preparation for advanced coursework.</li></ol> |
| <b>Indicative Contents</b>                                                                                                       | Indicative Contents (Total SSWL = 124 hrs, over 15 weeks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| المحتويات الإرشادية | <ol style="list-style-type: none"><li>1. Introduction to OOP Paradigm: procedural vs. object-oriented programming, classes, objects, attributes, and methods. (1 week, 8 hrs)</li><li>2. Encapsulation: access modifiers, getters/setters, constructors/destructors/destructors/destructors/destructors, data validation. (1.5 weeks, 12 hrs)</li><li>3. Abstraction: abstract classes, interfaces, simplified APIs for complex systems. (1 week, 8 hrs)</li><li>4. Inheritance: single and multi-level inheritance, is-a vs. has-a relationships, method overriding, super/base class mechanisms. (2 weeks, 16 hrs)</li><li>5. Polymorphism: compile-time (overloading) and runtime (overriding) polymorphism, dynamic method dispatch, duck typing. (1.5 weeks, 12 hrs)</li><li>6. Class Relationships &amp; UML: association, aggregation, composition, class/object diagrams, translating problem statements into designs. (1.5 weeks, 12 hrs)</li><li>7. Exception Handling in OOP Context: custom exception classes, try/catch/finally within object-oriented systems. (1 week, 8 hrs)</li><li>8. File/Data Persistence with Objects: object serialization/deserialization, basic file I/O with object structures. (1 week, 8 hrs)</li><li>9. Design Principles &amp; Best Practices: OLID principles (intro-level), common design patterns (Singleton, Factory, Observer), code smells and refactoring basics. *(1.5 weeks, 12 hrs)</li><li>10. Testing &amp; Debugging OOP Code: unit testing basics, debugging strategies for object interactions. (1 week, 8 hrs)</li><li>11. Case Studies / Applied Mini-Projects: real-world modeling exercises (e.g. library, banking, or inventory system) and a capstone-style integrative project. (2 weeks, 20 hrs)</li></ol> <p>Total: 15 weeks, 124 hrs (contact/timetable hours)<br/>Exam hours (76 hrs) are recorded separately, total SSWL to 200 hrs.</p> |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Strategies</b></p> <p>الإستراتيجيات</p> | <p>This module employs a blended learning strategy combining lecture-based instruction with visual aids and UML models to deliver core OOP theory, hands-on programming labs for direct application of classes, objects, and design patterns, and problem-based learning through real-world scenarios such as library or banking systems. Students further engage in case study analysis and collaborative mini projects to evaluate reusable and maintainable software designs, culminating in a final integrative project that requires them to combine all four OOP pillars: encapsulation, inheritance, polymorphism, and abstraction into a single working application.</p> <p>يعتمد هذا المقرر على استراتيجيات تعلم متكاملة تجمع بين المحاضرات النظرية المدعومة بالوسائل البصرية ومخططات UML لتوصيل المفاهيم الأساسية للبرمجة كائنية التوجه، والمختبرات العملية التي تتيح للطلبة تطبيق مفاهيم الأصناف (Classes) والكائنات (Objects) وأنماط التصميم بشكل مباشر، إضافة إلى التعلم القائم على حل المشكلات من خلال أمثلة واقعية مثل أنظمة المكتبات أو الأنظمة المصرفية. كما يشارك الطلبة في تحليل دراسات حالة ومشاريع جماعية صغيرة لتقييم قابلية إعادة الاستخدام والصيانة في تصاميم البرمجيات، لينتهي المقرر بمشروع تكاملي نهائي يتطلب من الطلبة دمج الركائز الأربع للبرمجة كائنية التوجه التغليف (Encapsulation)، والوراثة (Inheritance)، وتعدد الأشكال (Polymorphism)، والتجريد (Abstraction) ضمن تطبيق برمجي واحد متكامل.</p> |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Student Workload (SWL)

### الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا

|                                                                                            |     |                                                                                       |     |
|--------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------|-----|
| <p><b>Structured SWL (hr/sem)</b></p> <p>الحمل الدراسي المنتظم للطلاب خلال الفصل</p>       | 124 | <p><b>Structured SWL (hr/w)</b></p> <p>الحمل الدراسي المنتظم للطلاب أسبوعيا</p>       | 8.3 |
| <p><b>Unstructured SWL (hr/sem)</b></p> <p>الحمل الدراسي غير المنتظم للطلاب خلال الفصل</p> | 76  | <p><b>Unstructured SWL (hr/w)</b></p> <p>الحمل الدراسي غير المنتظم للطلاب أسبوعيا</p> | 5   |
| <p><b>Total SWL (hr/sem)</b></p> <p>الحمل الدراسي الكلي للطلاب خلال الفصل</p>              | 200 |                                                                                       |     |

## Module Evaluation

### تقييم المادة الدراسية

|  | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|--|-------------|----------------|----------|---------------------------|
|--|-------------|----------------|----------|---------------------------|



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                      |                 |     |                  |            |                                                      |
|----------------------|-----------------|-----|------------------|------------|------------------------------------------------------|
| Formative assessment | Quizzes         | 2   | 10% (10)         | 5 and 10   | Quiz 1: LO #1, #2, #3, #4, Quiz 2: LO #5, #6, #7     |
|                      | Assignments     | 2   | 10% (10)         | 2 and 12   | Assignment 1: LO #1, #2, #3, Assignment 2: LO #8, #9 |
|                      | Projects / Lab. | 1   | 10% (10)         | Continuous | All                                                  |
|                      | Report          | 1   | 10% (10)         | 13         | LO #5, #8 and #10                                    |
| 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 (Theoretical Weekly Syllabus) |                                                                                                              |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| المنهاج الاسبوعي النظري                     |                                                                                                              |
|                                             | Material Covered                                                                                             |
| Week 1                                      | Introduction to OOP Paradigm vs. Object-Oriented Programming, Classes, Objects, Attributes, and Methods      |
| Week 2                                      | Encapsulation: Access Modifiers (private, protected, public), Constructors and Destructors                   |
| Week 3                                      | Encapsulation (cont'd) Getters/Setters, Data Validation within Classes                                       |
| Week 4                                      | Abstraction: Abstract Classes vs. Concrete Classes, Interfaces and Contracts                                 |
| Week 5                                      | Inheritance: Single and Multi-level Inheritance                                                              |
| Week 6                                      | Inheritance (cont'd) Method Overriding, Super/Base Class Mechanisms                                          |
| Week 7                                      | Mid-term Exam + Polymorphism: Compile-time Polymorphism                                                      |
| Week 8                                      | Polymorphism (cont'd) Runtime Polymorphism (Overriding), Dynamic Method Dispatch                             |
| Week 9                                      | Class Relationships & UML: Association, Aggregation, Composition                                             |
| Week 10                                     | Class Relationships & UML (cont'd) Class/Object Diagrams, Translating Problem Statements into Designs        |
| Week 11                                     | Exception Handling in OOP Context: Custom Exception Classes, Try/Catch/Finally                               |
| Week 12                                     | File/Data Persistence with Objects: Object Serialization/Deserialization, Basic File I/O                     |
| Week 13                                     | Design Principles & Best Practices: SOLID Principles (Intro), Design Patterns (Singleton, Factory, Observer) |
| Week 14                                     | Testing & Debugging OOP Code: Unit Testing Basics, Debugging Object Interactions                             |
| Week 15                                     | Case Studies & Applied Mini-Projects: Real-World Modeling, Integrative Capstone-Style Project                |
| Week 16                                     | Preparatory Week before the Final Exam                                                                       |



### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

|                | Material Covered                                                        |
|----------------|-------------------------------------------------------------------------|
| <b>Week 1</b>  | Lab 1: Introduction to the Programming Environment and IDE Setup        |
| <b>Week 2</b>  | Lab 2: Defining Classes and Objects with Attributes and Methods         |
| <b>Week 3</b>  | Lab 3: Encapsulation (Access Modifiers, Getters/Setters, Constructors)  |
| <b>Week 4</b>  | Lab 4: Abstraction (Abstract Classes and Interfaces)                    |
| <b>Week 5</b>  | Lab 5: Inheritance (Building Class Hierarchies)                         |
| <b>Week 6</b>  | Lab 6: Polymorphism (Method Overloading and Overriding)                 |
| <b>Week 7</b>  | Lab 7: UML Class Diagrams and Class Relationships                       |
| <b>Week 8</b>  | Lab 8: Exception Handling (Custom Exceptions and Try/Catch)             |
| <b>Week 9</b>  | Lab 9: File Handling and Object Serialization                           |
| <b>Week 10</b> | Lab 10: Integrative Mini-Project (Applying All Four OOP Pillars) Part 1 |
| <b>Week 11</b> | Lab 11: Integrative Mini-Project (Applying All Four OOP Pillars) Part 2 |

### Learning and Teaching Resources

#### مصادر التعليم والتعلم

|                          | Text                                                                                                                                                                                                      | Available in the Library? |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Python Crash Course, Eric Matthes, No Starch Press                                                                                                                                                        | Yes                       |
| <b>Recommended Texts</b> | 1.Object-Oriented Programming in Python, Dusty Phillips<br>(Python 3 Object-Oriented Programming), Packt Publishing<br>2.Head First Design Patterns, Eric Freeman and Elisabeth<br>Robson, O'Reilly Media | No                        |
| <b>Websites</b>          | <a href="https://www.coursera.org/specializations/python-3-programming">https://www.coursera.org/specializations/python-3-programming</a>                                                                 |                           |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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 with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



امسح الكود للوصول إلى النسخة الإلكترونية



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                            |                      |                                                                                                                                                                                                                                                                                                                              |                                  |
|------------------------------------|----------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| معلومات المادة الدراسية            |                            |                      |                                                                                                                                                                                                                                                                                                                              |                                  |
| Module Title                       | Probability and Statistics |                      | Module Delivery                                                                                                                                                                                                                                                                                                              |                                  |
| Module Type                        | core                       |                      | <div><input checked="" type="checkbox"/> Theory</div> <div><input checked="" type="checkbox"/> Lecture</div> <div><input type="checkbox"/> Lab</div> <div><input checked="" type="checkbox"/> Tutorial</div> <div><input checked="" type="checkbox"/> Practical</div> <div><input checked="" type="checkbox"/> Seminar</div> |                                  |
| Module Code                        | AIC1203                    |                      |                                                                                                                                                                                                                                                                                                                              |                                  |
| ECTS Credits                       | 50                         |                      |                                                                                                                                                                                                                                                                                                                              |                                  |
| SWL (hr/sem)                       | 2                          |                      |                                                                                                                                                                                                                                                                                                                              |                                  |
| Module Level                       | UG1                        | Semester of Delivery |                                                                                                                                                                                                                                                                                                                              |                                  |
| Administering Department           |                            | AIBD                 | College                                                                                                                                                                                                                                                                                                                      | AIC                              |
| Module Leader                      | Dr. Basad Al-Sarray        |                      | e-mail                                                                                                                                                                                                                                                                                                                       | basad.husain@sc.uobaghdad.edu.iq |
| Module Leader's Academic Title     |                            | Assistant Professor  | Module Leader's Qualification                                                                                                                                                                                                                                                                                                | Ph.D.                            |
| Module Tutor                       | -                          |                      | e-mail                                                                                                                                                                                                                                                                                                                       | -                                |
| Peer Reviewer Name                 |                            |                      | e-mail                                                                                                                                                                                                                                                                                                                       |                                  |
| Scientific Committee Approval Date |                            |                      | Version Number                                                                                                                                                                                                                                                                                                               | 1                                |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى |            |          |   |
|------------------------------------------------------------------|------------|----------|---|
| Prerequisite module                                              | Calculus-I | Semester | 1 |
| Co-requisites module                                             |            | Semester |   |

| Module Objectives, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية |                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Objectives                                                                                                         | To introduce fundamental concepts of probability theory and statistical analysis.<br>To develop understanding of data distributions and uncertainty modeling. |



|                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| أهداف المادة الدراسية                                                       | <p>To equip students with tools for descriptive and inferential statistics.<br/>To enable interpretation of real-world data using statistical methods.<br/>To build analytical thinking for decision-making under uncertainty.<br/>To prepare students for applications in data science, AI, and research.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Module Learning Outcomes</b></p> <p>مخرجات التعلم للمادة الدراسية</p> | <p>Define basic probability concepts and axioms.<br/>Differentiate between discrete and continuous random variables.<br/>Compute probabilities using common distributions (Binomial, Normal, Poisson).<br/>Apply descriptive statistics (mean, variance, standard deviation).<br/>Perform hypothesis testing and confidence interval estimation.<br/>Analyze relationships using correlation and regression.<br/>Interpret statistical results in real-world contexts.<br/>Use tools like Excel, R, or Python for statistical analysis.<br/>Construct probability models for real datasets.<br/>Conduct small statistical projects and present findings.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p>                | <p>Indicative content includes the following.</p> <p><b>Part A – Foundations of Probability</b></p> <p>Basic Concepts – Sample space, events, probability axioms. [SSWL=10 hrs]</p> <p>Counting Techniques – Permutations, combinations, counting rules. [SSWL=8 hrs]</p> <p>Conditional Probability &amp; Bayes Theorem. [SSWL=10 hrs]</p> <p><b>Part B – Random Variables and Distributions</b></p> <p>Discrete Random Variables – PMF, expectation, variance. [SSWL=10 hrs]</p> <p>Continuous Random Variables – PDF, CDF, properties. [SSWL=10 hrs]</p> <p>Common Distributions – Binomial, Poisson, Normal. [SSWL=12 hrs]</p> <p><b>Part C – Descriptive and Inferential Statistics</b></p> <p>Descriptive Statistics – Mean, median, mode, variance, skewness. [SSWL=8 hrs]</p> <p>Sampling Methods and Data Collection. [SSWL=8 hrs]</p> <p>Confidence Intervals and Hypothesis Testing. [SSWL=12 hrs]</p> <p><b>Part D – Statistical Modeling and Applications</b></p> <p>Correlation and Regression Analysis. [SSWL=10 hrs]</p> <p>ANOVA and Statistical Decision Making. [SSWL=8 hrs]</p> <p>Statistical Tools – Excel, R, Python (NumPy, Pandas, SciPy). [SSWL=12 hrs]</p> <p>Project Work and Review Sessions. [SSWL=12 hrs]</p> |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|  |  |
|--|--|
|  |  |
|--|--|

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                     |     |
|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----|
| Strategies<br><br>الإستراتيجيات                                          | Students are expected to use their knowledge in probability to solve problems. This course strengthens students' understanding of probability in simulation and random number generation. Statistics concepts are important in data collection and analysis process. Emphasis is placed on the exploration of real-world statistics applications. Students are expected to learn to choose and use appropriate statistics to analyze empirical situations, to understand them better, and to improve decisions |                                                                     |     |
| Student Workload (SWL)<br>الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                     |     |
| Structured SWL (hr/sem)<br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Structured SWL (hr/w)<br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 2.2 |
| Unstructured SWL (hr/sem)<br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Unstructured SWL (hr/w)<br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 1.1 |
| Total SWL (hr/sem)<br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                     |     |

| Module Evaluation<br>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 #3, #4 and #6, #7      |
|                                            | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                                            | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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 (Theoretical Weekly Syllabus)<br>المناهج الأسبوعية النظرية |                                                                                                                           |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|                                                                          | Material Covered                                                                                                          |
| Week 1                                                                   | Introduction and basic concepts of statistics and definitions. Types of data sets, types of sampling and collecting data. |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                |                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Week 2</b>  | Construction of frequency distributions (grouped data and ungrouped data )<br>Relative frequency distributions and cumulative frequency distributions (less than & more than) |
| <b>Week 3</b>  | Frequency Distribution Charts : Histogram, Polygon, curve and Pie charts.                                                                                                     |
| <b>Week 4</b>  | Measures of Central Tendency , Measures of Variation                                                                                                                          |
| <b>Week 5</b>  | Introduction to probability and counting rules                                                                                                                                |
| <b>Week 6</b>  | Combinations and Permutation                                                                                                                                                  |
| <b>Week 7</b>  | Mid-term Exam                                                                                                                                                                 |
| <b>Week 8</b>  | Probability of discrete random variable                                                                                                                                       |
| <b>Week 9</b>  | Probability of continuous discrete random                                                                                                                                     |
| <b>Week 10</b> | Moments computing of density and mas function                                                                                                                                 |
| <b>Week 11</b> | Discrete probability distribution: (Uniform -Binomial)                                                                                                                        |
| <b>Week 12</b> | Continuous probability distribution(Uniform , Normal)                                                                                                                         |
| <b>Week 13</b> | Simulation experiments and data generation                                                                                                                                    |
| <b>Week 14</b> | <b>Seminar and discussion of groups projects</b>                                                                                                                              |
| <b>Week 15</b> | Preparation of final exam                                                                                                                                                     |
| <b>Week 16</b> | Final exam                                                                                                                                                                    |

| Learning and Teaching Resources<br>مصادر التعليم والتعلم |                                                                                                                                                                                                                                                                                    |                           |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                          | Text                                                                                                                                                                                                                                                                               | Available in the Library? |
| <b>Required Texts</b>                                    | Elementary Statistics: A Step By Step Approach ISE. 11th Edition<br>1265248125 · 9781265248123<br>By Allan G. Bluman © 2023   Published: September 22, 2022<br><br>Ross, Sheldon M. Introduction to probability and statistics for engineers and scientists. Academic press, 2020. |                           |
| <b>Recommended Texts</b>                                 | <i>Rohatgi, Vijay K., and AK Md Ehsanes Saleh. An introduction to probability and statistics. John Wiley &amp; Sons, 2015.</i>                                                                                                                                                     | yes                       |
| <b>Websites</b>                                          | <a href="https://www.mheducation.co.uk/elementary-statistics-a-step-by-step-approach-ise-9781265248123-emea-group">https://www.mheducation.co.uk/elementary-statistics-a-step-by-step-approach-ise-9781265248123-emea-group</a>                                                    |                           |

| Grading Scheme<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</b>                   | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



| (0 – 49) | F – Fail | راسب | (0-44) | Considerable amount of work required |
|----------|----------|------|--------|--------------------------------------|
|          |          |      |        |                                      |

**Note:** Marks with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



امسح الكود للوصول إلى النسخة الإلكترونية



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |              |                      |                               |                                                                                                                                                                                                                               |       |
|------------------------------------|--------------|----------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| معلومات المادة الدراسية            |              |                      |                               |                                                                                                                                                                                                                               |       |
| Module Title                       | Calculus II  |                      |                               | Module Delivery                                                                                                                                                                                                               |       |
| Module Type                        | Core         |                      |                               | <input checked="" type="checkbox"/> Theory<br><input type="checkbox"/> Lecture<br><input type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |       |
| Module Code                        | CAI1202      |                      |                               |                                                                                                                                                                                                                               |       |
| ECTS Credits                       | 6            |                      |                               |                                                                                                                                                                                                                               |       |
| SWL (hr/sem)                       | 150          |                      |                               |                                                                                                                                                                                                                               |       |
| Module Level                       | 1            | Semester of Delivery |                               |                                                                                                                                                                                                                               | 2     |
| Administering Department           |              | AIBD                 | College                       | AIC                                                                                                                                                                                                                           |       |
| Module Leader                      | Ziyad Allawi |                      | e-mail                        | Ziyad.allawi@coeng.uobaghdad.edu.iq                                                                                                                                                                                           |       |
| Module Leader's Acad. Title        |              | Asst. Prof           | Module Leader's Qualification |                                                                                                                                                                                                                               | Ph.D. |
| Module Tutor                       |              |                      | e-mail                        |                                                                                                                                                                                                                               |       |
| Peer Reviewer Name                 |              |                      | e-mail                        |                                                                                                                                                                                                                               |       |
| Scientific Committee Approval Date |              | 1/10/2025            | Version Number                |                                                                                                                                                                                                                               | 1.0   |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى |            |          |   |
|------------------------------------------------------------------|------------|----------|---|
| Prerequisite module                                              | Calculus I | Semester | 1 |
| Co-requisites module                                             | None       | Semester |   |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية |                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module Objectives<br>أهداف المادة الدراسية                                                                         | This module transitions students from differential to integral calculus. The objective is to introduce the concept of accumulation through Riemann sums and formalize it via the definite integral. The course aims to establish the deep connection between differentiation and integration (The Fundamental Theorem of Calculus) and train |



|                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | students to apply integration to complex geometric, physical, and analytical problems, alongside mastering advanced techniques of integration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Module Learning Outcomes</b><br><br>مخرجات التعلم للمادة الدراسية | <p><b>Upon successful completion of this module, students will be able to:</b></p> <p><b>Formulate Riemann sums to approximate areas and understand the limit definition of the definite integral.</b></p> <p><b>Apply the Fundamental Theorem of Calculus to evaluate definite integrals and understand net change.</b></p> <p><b>Use integration to solve geometric problems, including the area between curves, volumes of solids of revolution, arc length, and surface area.</b></p> <p><b>Understand the rigorous calculus-based definitions of the natural logarithm and exponential functions.</b></p> <p><b>Evaluate complex indefinite and definite integrals using advanced techniques (substitution, partial fraction decomposition).</b></p> <p><b>Determine the convergence or divergence of improper integrals.</b></p>                                               |
| <b>Indicative Contents</b><br><br>المحتويات الإرشادية                | <p>The Definite Integral: Riemann sums, area approximations, average value of a function.</p> <p>Fundamental Theorem of Calculus: Connecting antiderivatives to definite integrals, integrating rates of change.</p> <p>Applications of Integrals: Area between curves, volumes (slicing, disk, and washer methods), arc length of a curve, areas of surfaces of revolution.</p> <p>Transcendental Functions: The natural logarithm defined as an integral, the exponential function as an inverse, relative rates of growth (Big-O notation).</p> <p>Techniques of Integration: Advanced algebraic substitutions, completing the square, partial fraction decomposition (Heaviside method).</p> <p>Advanced Tools: Using Integral Tables and Computer Algebra Systems (CAS), evaluating improper integrals (infinite limits or infinite discontinuities), and comparison tests.</p> |

### Learning and Teaching Strategies

#### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <p>Lectures: Step-by-step derivations of integral applications (e.g., deriving the arc length formula) and technique demonstrations.</p> <p>Visual/Spatial Learning: Utilizing 3D modeling software or physical manipulatives to help students visualize cross-sections and solids of revolution, which is often a major hurdle in Calculus II.</p> <p>Problem-Based Tutorials: Supervised practice focusing heavily on algebraic manipulation and pattern recognition required for advanced integration techniques.</p> <p>Formative Assessments: Short, regular quizzes to ensure students are memorizing key integration formulas and maintaining algebraic fluency.</p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)



### الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

|                                                                                |            |                                                                           |     |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|-----|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 63         | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 4.2 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 87         | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 5.8 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | <b>150</b> |                                                                           |     |

### Module Evaluation

#### تقييم المادة الدراسية

|                             |                        | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|-----------------------------|------------------------|-------------|------------------|------------|---------------------------|
| <b>Formative assessment</b> | <b>Quizzes</b>         | 5           | 10%              | 5 and 10   | LO #1, #2 and #10, #11    |
|                             | <b>Assignments</b>     | 1           | 10%              | 2 and 12   | LO #3, #4 and #6, #7      |
|                             | <b>Projects / Lab.</b> | 1           | 10%              | Continuous | All                       |
|                             | <b>Report</b>          | 1           | 10%              | 13         | LO #5, #8 and #10         |
| <b>Summative assessment</b> | <b>Midterm Exam</b>    | 2hr         | 10% (10)         | 7          | LO #1 - #7                |
|                             | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16         | All                       |
| <b>Total assessment</b>     |                        |             | 100% (100 Marks) |            |                           |

### Delivery Plan (Weekly Syllabus)

#### المنهاج الاسبوعي النظري

| Week          | Material Covered                                                               |
|---------------|--------------------------------------------------------------------------------|
| <b>Week 1</b> | Approximating Areas, Sigma Notation, Riemann Sums                              |
| <b>Week 2</b> | The Definite Integral                                                          |
| <b>Week 3</b> | The Fundamental Theorem of Calculus, Indefinite Integrals, Substitution Method |
| <b>Week 4</b> | Definite Integral Substitution, Area Between Curves                            |
| <b>Week 5</b> | Volumes Using Cross-Sections, Volumes Using Cylindrical Shells                 |
| <b>Week 6</b> | Arc Length, Areas of Surfaces of Revolution                                    |
| <b>Week 7</b> | Work and Fluid Forces, Moments, Centers of Mass                                |
| <b>Week 8</b> | Mid-Term Examination                                                           |
| <b>Week 9</b> | The Logarithm Defined as an Integral                                           |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                |                                                                           |
|----------------|---------------------------------------------------------------------------|
| <b>Week 10</b> | Hyperbolic Functions                                                      |
| <b>Week 11</b> | Basic Integration Formulas, Integrating by Parts                          |
| <b>Week 12</b> | Trigonometric Substitutions, Integration by Partial Fractions             |
| <b>Week 13</b> | Improper Integrals                                                        |
| <b>Week 14</b> | Parameterization of Plane Curves, Calculus with Parametric Curves         |
| <b>Week 15</b> | Polar Coordinates, Graphing Polar Coordinate Equations, Areas and Lengths |
| <b>Week 16</b> | Final-Term Examination                                                    |

### Learning and Teaching Resources

#### مصادر التعلم والتدريس

|                          | Text                                                                                                                                                                  | Available in the Library? |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Thomas' Calculus Early Transcendentals (11th Edition)<br>(Thomas Series), Addison-Wesley Longman Publishing Co.,<br>Boston, MA, United States, ISBN 978-0-321-19800-6 | Y                         |
| <b>Recommended Texts</b> |                                                                                                                                                                       | Y                         |
| <b>Websites</b>          |                                                                                                                                                                       |                           |

### Grading Scheme

#### 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  |

**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.



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
جامعة بغداد

بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



ملاحظة: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                                  |                  |                                                                                                                                                                                                                                                                |                          |                      |
|------------------------------------|----------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------|
| معلومات المادة الدراسية            |                                  |                  |                                                                                                                                                                                                                                                                |                          |                      |
| Module Title                       | Engineering Drawing              |                  | Module Delivery                                                                                                                                                                                                                                                |                          |                      |
| Module Type                        | CORE                             |                  | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input type="checkbox"/> Lab<br><input checked="" type="checkbox"/> Tutorial<br><input checked="" type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                          |                      |
| Module Code                        | AIC1204                          |                  |                                                                                                                                                                                                                                                                |                          |                      |
| ECTS Credits                       | 4                                |                  |                                                                                                                                                                                                                                                                |                          |                      |
| SWL (hr/sem)                       | 100                              |                  |                                                                                                                                                                                                                                                                |                          |                      |
| Module Level                       |                                  | 1                |                                                                                                                                                                                                                                                                |                          | Semester of Delivery |
| Administering Department           |                                  | AIBD             | College                                                                                                                                                                                                                                                        | AIC                      |                      |
| Module Leader                      | Assoc. Prof. Dr. Wisam Al-Wajidi |                  | e-mail                                                                                                                                                                                                                                                         | wisam.h@uobaghdad.edu.iq |                      |
| Module Leader's Academic Title     |                                  | Assoc. Prof. Dr. | Module Leader's Qualification                                                                                                                                                                                                                                  |                          | Ph.D.                |
| Module Tutor                       |                                  |                  | e-mail                                                                                                                                                                                                                                                         |                          |                      |
| Peer Reviewer Name                 |                                  |                  | e-mail                                                                                                                                                                                                                                                         |                          |                      |
| Scientific Committee Approval Date |                                  |                  | Version Number                                                                                                                                                                                                                                                 |                          | 1.0                  |

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



| <b>Module Objectives, Learning Outcomes and Indicative Contents</b><br>أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                                                                                | <ol style="list-style-type: none"><li>1. Understand the fundamentals of engineering drawing standards and conventions.</li><li>2. Develop skills in creating and interpreting technical drawings.</li><li>3. Apply orthographic, isometric, and sectional drawing techniques.</li><li>4. Visualize and represent three-dimensional engineering components accurately.</li><li>5. Use engineering drawings for effective communication in design and manufacturing.</li><li>6. Apply the state-of-the-art computer drafting for the Engineering Applications</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية                                                                 | <p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"><li>1. Explain the fundamental principles, standards, and conventions of engineering drawing.</li><li>2. Use drawing instruments and CAD software to prepare accurate engineering drawings.</li><li>3. Construct and interpret lettering, scales, dimensioning, and geometric constructions.</li><li>4. Draw orthographic projections of points, lines, and planes according to engineering standards.</li><li>5. Develop orthographic projections of simple and complex solids in different positions.</li><li>6. Create sectional views and identify appropriate sectioning techniques for engineering components.</li><li>7. Prepare auxiliary views to represent inclined and oblique surfaces accurately.</li><li>8. Draw isometric views and convert between orthographic and isometric projections.</li><li>9. Generate development of surfaces for common engineering solids and sheet metal components.</li><li>10. Interpret and prepare assembly and detailed working drawings of mechanical components.</li><li>11. Apply tolerances, limits, fits, and surface finish symbols in engineering drawings.</li><li>12. Read and interpret industrial engineering drawings in accordance with international standards.</li><li>13. Demonstrate spatial visualization skills for solving engineering graphical problems.</li><li>14. Apply engineering drawing principles to communicate design concepts effectively in engineering practice.</li><li>15. Produce complete, accurate, and professional engineering drawings that meet accepted engineering standards.</li></ol> |
| <b>Indicative Contents</b>                                                                                                       | Indicative content includes the following.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| المحتويات الإرشادية | <p><b>Introduction to Engineering Drawing:</b> Engineering graphics, standards (ISO/ASME), drawing instruments, sheet layout, line types, lettering, scales. [4 hrs]</p> <p><b>Geometric Constructions and Dimensioning:</b> Geometric constructions, engineering symbols, dimensioning methods, tolerances, fits. [6 hrs]</p> <p><b>Orthographic Projection:</b> Principles of projection, first-angle and third-angle projection, projection of points, lines, planes, and simple solids. [10 hrs]</p> <p><b>Sectional Views and Auxiliary Views:</b> Full, half, offset, broken-out sections; auxiliary projections. [6 hrs]</p> <p><b>Isometric and Pictorial Drawing:</b> Isometric projection, isometric drawing, conversion between orthographic and isometric views. [6 hrs]</p> <p><b>Development of Surfaces:</b> Development of prisms, pyramids, cylinders, cones, transition pieces, and sheet-metal applications. [5 hrs]</p> <p><b>Introduction to CAD (SolidWorks):</b> Interface, file management, templates, sketch environment, coordinate systems. [4 hrs]</p> <p><b>2D Sketching in SolidWorks:</b> Sketch tools, geometric constraints, dimensions, editing, design intent. [8 hrs]</p> <p><b>3D Part Modeling:</b> Extrude, Revolve, Sweep, Loft, Hole Wizard, Fillet, Chamfer, Shell, Draft, Patterns, Mirror. [10 hrs]</p> <p><b>Assembly Modeling:</b> Mates, assembly constraints, exploded views, interference detection, motion basics. [6 hrs]</p> <p><b>Engineering Drawings from SolidWorks Models:</b> Standard views, section views, detail views, dimensions, annotations, tolerances, Bill of Materials (BOM). [6 hrs]</p> <p><b>Course Project and Practical Applications:</b> Complete design project integrating manual drawing, 3D modeling, assembly, and manufacturing drawings. [4 hrs]</p> |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



### استراتيجيات التعلم والتعليم

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b><br><br>الإستراتيجيات | <ul style="list-style-type: none"> <li>Interactive lectures</li> <li>Demonstration of engineering drawing techniques</li> <li>Hands-on laboratory sessions (SolidWorks)</li> <li>Guided drawing and CAD exercises</li> <li>Problem-solving and design assignments</li> <li>Individual and group projects</li> <li>Case studies and real engineering examples</li> <li>Self-directed learning and practice</li> <li>Continuous feedback and formative assessment</li> </ul> <p>These strategies effectively support both manual engineering drawing skills and CAD proficiency.</p> |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب ل ١٥ اسبوعا

|                                                                                 |     |                                                                            |     |
|---------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------|-----|
| <b>Structured SWL (hr/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 64  | <b>Structured SWL (hr/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا       | 4.3 |
| <b>Unstructured SWL (hr/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 36  | <b>Unstructured SWL (hr/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 2.4 |
| <b>Total SWL (hr/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 100 |                                                                            |     |

### 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 #3, #4 and #6, #7      |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                       |
|                      | Report          | 1           | 10% (10)         | 13         | LO #5, #8 and #10         |
| 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 (Theoretical Weekly Syllabus)

#### المنهاج الاسبوعي النظري

|         | Material Covered                                                                                                           |
|---------|----------------------------------------------------------------------------------------------------------------------------|
| Week 1  | Introduction to Engineering Drawing, drawing standards (ISO), drawing instruments, sheet layout, line types, and lettering |
| Week 2  | Scales, geometric constructions, and dimensioning principles                                                               |
| Week 3  | Orthographic projection: Principles, projection of points and lines                                                        |
| Week 4  | Projection of planes and true shapes                                                                                       |
| Week 5  | Projection of solids (prisms, pyramids, cylinders, cones)                                                                  |
| Week 6  | Advanced projection of solids in different positions                                                                       |
| Week 7  | Sectional views: Full, half, offset, and broken sections                                                                   |
| Week 8  | Auxiliary views and visualization techniques                                                                               |
| Week 9  | Isometric projection: Principles and methods                                                                               |
| Week 10 | Isometric drawing from orthographic views                                                                                  |
| Week 11 | Orthographic drawing from isometric views                                                                                  |
| Week 12 | Development of surfaces of common solids                                                                                   |
| Week 13 | Working drawings, dimensioning, and engineering symbols                                                                    |
| Week 14 | Assembly and detail drawings of simple mechanical components                                                               |
| Week 15 | Course review and comprehensive drawing exercise                                                                           |
| Week 16 | Preparatory week before the final Exam                                                                                     |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

|        | Material Covered                                                                                      |
|--------|-------------------------------------------------------------------------------------------------------|
| Week 1 | Introduction to SolidWorks: User interface, file management, templates, units, and navigation         |
| Week 2 | Basic 2D sketching: Lines, circles, arcs, rectangles, polygons, trim, offset, and sketch constraints  |
| Week 3 | Advanced sketching: Smart dimensions, geometric relations, sketch editing, and fully defined sketches |
| Week 4 | Basic 3D modeling: Extruded Boss/Base, Extruded Cut, Revolved Boss/Base, and Revolved Cut             |
| Week 5 | Feature-based modeling: Fillet, Chamfer, Hole Wizard, Shell, Draft, and Rib features                  |
| Week 6 | Pattern and Mirror features: Linear, Circular, Sketch-driven Patterns, and Mirror                     |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                |                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------|
| <b>Week 7</b>  | Advanced modeling: Sweep, Loft, Reference Geometry (Planes, Axes), and Helix/Spiral                        |
| <b>Week 8</b>  | Midterm practical exercise: Modeling of individual mechanical parts                                        |
| <b>Week 9</b>  | Assembly modeling: Inserting components, standard mates, and assembly constraints                          |
| <b>Week 10</b> | Advanced assemblies: Exploded views, interference detection, and assembly management                       |
| <b>Week 11</b> | Engineering drawings: Standard views, projected views, dimensions, annotations, and centerlines            |
| <b>Week 12</b> | Advanced drawings: Section views, detail views, auxiliary views, broken views, and Bill of Materials (BOM) |
| <b>Week 13</b> | Sheet metal and weldment basics (or practical part modeling exercises, depending on program requirements)  |
| <b>Week 14</b> | Integrated CAD project: Part modeling, assembly creation, and production drawing preparation               |
| <b>Week 15</b> | Final practical project presentation and laboratory assessment                                             |

| Learning and Teaching Resources |                                                                                                                                                                                                                                                                                                                                                                                   |                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| مصادر التعليم والتعلم           |                                                                                                                                                                                                                                                                                                                                                                                   |                           |
|                                 | Text                                                                                                                                                                                                                                                                                                                                                                              | Available in the Library? |
| <b>Required Texts</b>           | <ul style="list-style-type: none"> <li>David Madsen, Engineering Drawing and Design, 5th Edition, Cengage Learning, 2011</li> <li>Engineering Drawing by N. D. Bhatt.</li> <li>Practical Geometry &amp; Engineering Graphics by Abbot.</li> <li>Shirley, P., Ashikhmin, M., &amp; Marschner, S. (2009). <i>Fundamentals of computer graphics</i>. AK Peters/CRC Press.</li> </ul> | Yes                       |
| <b>Recommended Texts</b>        | <ul style="list-style-type: none"> <li>Dennis K. Lieu, Sheryl A. Sorby, Visualization, Modeling, and Graphics for Engineering Design, 2nd Edition, Cengage Learning, 2016</li> <li>Technical Graphics Communication by Bertoline Wiebe, Miller. Mohler, Irwin McGraw-Hill.</li> <li>Machine Drawing By. Dr. K. L. Narayana.</li> </ul>                                            | No                        |
| <b>Websites</b>                 |                                                                                                                                                                                                                                                                                                                                                                                   |                           |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي/ البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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 with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



## MODULE DESCRIPTION CATALOGUE

### وصف المادة الدراسية

| Module Information                 |                      |                     |                                                                                                                                                                                                                                                                                                  |        |
|------------------------------------|----------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| معلومات المادة الدراسية            |                      |                     |                                                                                                                                                                                                                                                                                                  |        |
| Module Title                       | Big Data Engineering |                     | Module Delivery                                                                                                                                                                                                                                                                                  |        |
| Module Type                        | Core                 |                     | <div><input checked="" type="checkbox"/>Theory</div> <div><input checked="" type="checkbox"/>Lecture</div> <div><input checked="" type="checkbox"/>Lab</div> <div><input type="checkbox"/>Tutorial</div> <div><input type="checkbox"/>Practical</div> <div><input type="checkbox"/>Seminar</div> |        |
| Module Code                        | AIBD1203             |                     |                                                                                                                                                                                                                                                                                                  |        |
| ECTS Credits                       | 4                    |                     |                                                                                                                                                                                                                                                                                                  |        |
| SWL (hr/sem)                       | 100                  |                     |                                                                                                                                                                                                                                                                                                  |        |
| Module Level                       |                      | 1                   |                                                                                                                                                                                                                                                                                                  |        |
| Administering Department           |                      | AIBD                | College                                                                                                                                                                                                                                                                                          | AIC    |
| Module Leader                      | Suhad Faisal         |                     | e-mail                                                                                                                                                                                                                                                                                           | E-mail |
| Module Leader's Academic Title     |                      | Assist. Professor   | Module Leader's Qualification                                                                                                                                                                                                                                                                    |        |
| Module Tutor                       |                      | Name (if available) | e-mail                                                                                                                                                                                                                                                                                           | E-mail |
| Peer Reviewer Name                 |                      | Name                | e-mail                                                                                                                                                                                                                                                                                           | E-mail |
| Scientific Committee Approval Date |                      |                     | Version Number                                                                                                                                                                                                                                                                                   | 1.0    |

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



## Module Objectives, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ومخرجات تعلمها ومحتوياتها الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"><li>1. Understand the fundamental principles and architecture of Big Data systems, including distributed storage, distributed processing, and real-time/batch data pipelines.</li><li>2. Enable students to understand the characteristics of Big Data (Volume, Velocity, Variety, Veracity, Value) and the ecosystem of tools used to manage it.</li><li>3. Develop skills in designing and implementing distributed storage and processing solutions (Hadoop, Spark).</li><li>4. Build proficiency in working with NoSQL databases and streaming/ingestion pipelines for real-world data.</li><li>5. Prepare students for advanced courses and research in data engineering, applied AI systems, and large-scale data analytics.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"><li>1. Explain the core characteristics of Big Data and the components of the Big Data ecosystem.</li><li>2. Describe the architecture of distributed storage systems (HDFS) and distributed processing frameworks (Hadoop, Spark).</li><li>3. Implement a MapReduce job to process large datasets in a distributed environment.</li><li>4. Design and implement Spark applications using RDDs, DataFrames, and Spark SQL for data transformation.</li><li>5. Apply appropriate NoSQL database models (key-value, document, column-family, graph) to real-world data problems.</li><li>6. Construct data ingestion and streaming pipelines using tools such as Kafka.</li><li>7. Use Hive/HiveQL to perform data warehousing and querying over large datasets.</li><li>8. Evaluate tradeoffs between batch and stream processing approaches for a given use case.</li><li>9. Analyze the performance and scalability of a given Big Data architecture, identifying bottlenecks and improvements.</li><li>10. Develop an end-to-end Big Data pipeline integrating storage, processing, and analytics components.</li><li>11. Justify architectural and tool choices in a Big Data solution, connecting them to cloud-based deployment and industry practice.</li></ol> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <p>Indicative Contents (Total SSWL = 63 hrs, over 15 weeks)</p> <p>Introduction to Big Data: Volume, Velocity, Variety, Veracity, Value; Big Data ecosystem overview. (1 week, 4 hrs)</p> <p>Distributed Storage Systems: HDFS architecture, replication, fault tolerance. (1 week, 4 hrs)</p> <p>Hadoop Ecosystem and YARN: cluster architecture, resource management. (1 week, 4 hrs)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>MapReduce Programming Model: map/reduce phases, job execution, word count and beyond. (1.5 weeks, 9 hrs)</p> <p>Apache Spark Fundamentals: RDDs, transformations/actions, DataFrames. (1.5 weeks, 9 hrs)</p> <p>Spark SQL and Data Processing: structured queries, performance optimization. (1 week, 4 hrs)</p> <p>NoSQL Databases: key-value, document, column-family, and graph stores (MongoDB, Cassandra, HBase). (1.5 weeks, 9 hrs)</p> <p>Data Ingestion and Streaming: Kafka, batch vs. real-time processing. (1 week, 4 hrs)</p> <p>Data Warehousing with Hive: Hive architecture, HiveQL querying. (1 week, 4 hrs)</p> <p>Big Data on Cloud Platforms: cloud-based storage/processing services (AWS/Azure/GCP). (1 week, 4 hrs)</p> <p>Big Data Analytics and ML at Scale: Spark MLlib, distributed machine learning basics. (1.5 weeks, 6 hrs)</p> <p>Integrative Project / Case Studies: end-to-end pipeline design and evaluation. (1.5 weeks, 6 hrs))</p> <p>Total: 15 weeks, 63 hrs (contact/timetable hours)</p> <p>Exam hours (3 hrs) recorded separately — Total SWL = 100 hrs (63 SSWL + 37 USSWL)</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Strategies</b></p> <p>الإستراتيجيات</p> | <p>This module employs a hands-on, systems-oriented learning strategy that combines lecture-based instruction on distributed computing theory with intensive lab practice on real Big Data tools such as Hadoop, Spark, and Kafka, supported by case studies drawn from industry-scale data problems. Students engage in progressive lab exercises that build from single-node MapReduce jobs to full distributed Spark pipelines and NoSQL database applications, reinforced through problem-based learning around real-world scenarios such as log analysis, streaming sensor data, and large-scale text processing. The module culminates in an integrative capstone project requiring students to design, implement, and justify a complete Big Data pipeline from ingestion through storage, processing, and analytics simulating the responsibilities of a data engineer in practice.</p> <p>يعتمد هذا المقرر على استراتيجية تعلم عملية تركز على الأنظمة، تجمع بين المحاضرات النظرية حول مفاهيم الحوسبة الموزعة والتطبيق العملي المكثف في المختبرات باستخدام أدوات البيانات الضخمة الحقيقية مثل Hadoop و Spark و Kafka، مدعومة بدراسات حالة مستمدة من مشكلات بيانات واقعية على المستوى الصناعي. ويشارك الطلبة في تمارين مختبرية تدريجية تبدأ بمهام MapReduce على عقدة واحدة وصولاً إلى بناء أنابيب معالجة موزعة كاملة باستخدام Spark وتطبيقات على قواعد</p> |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي/ البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|  |                                                                                                                                                                                                                                                                                                                                                                                                       |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | بيانات NoSQL ، معززة بالتعلم القائم على حل المشكلات ضمن سيناريوهات واقعية مثل تحليل السجلات (Logs) ومعالجة بيانات الاستشعار المتدفقة (Streaming) ومعالجة النصوص على نطاق واسع. ويختتم المقرر بمشروع تكاملي نهائي يتطلب من الطلبة تصميم وتنفيذ وتبرير أنبوب بيانات ضخمة متكامل من الإدخال (Ingestion) مروراً بالتخزين والمعالجة وصولاً إلى التحليل بما يحاكي مسؤوليات مهندس البيانات في الواقع العملي. |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعاً

|                                                                                 |     |                                                                             |     |
|---------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------|-----|
| <b>Structured SWL (hr/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 63  | <b>Structured SWL (hr/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعياً       | 4.2 |
| <b>Unstructured SWL (hr/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 37  | <b>Unstructured SWL (hr/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعياً | 2.5 |
| <b>Total SWL (hr/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 100 |                                                                             |     |

### Module Evaluation

تقييم المادة الدراسية

|                      |                 | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome                              |
|----------------------|-----------------|-------------|------------------|------------|--------------------------------------------------------|
| Formative assessment | Quizzes         | 2           | 10% (10)         | 4 and 10   | Quiz 1: LO #1, #2, #3<br>Quiz 2: LO #4, #5, #6, #7     |
|                      | Assignments     | 2           | 10% (10)         | 3 and 12   | Assignment 1: LO #2, #3<br>Assignment 2: LO #6, #7, #8 |
|                      | Projects / Lab. | 1           | 10% (10)         | Continuous | All                                                    |
|                      | Report          | 1           | 10% (10)         | 13         | LO #8, #9, #10                                         |
| Summative assessment | Midterm Exam    | 2hr         | 10% (10)         | 7          | LO #1 - #6                                             |
|                      | Final Exam      | 3hr         | 50% (50)         | 16         | All                                                    |
| Total assessment     |                 |             | 100% (100 Marks) |            |                                                        |

### Delivery Plan (Theoretical Weekly Syllabus)

المنهاج الأسبوعي النظري

|        | Material Covered                                                                         |
|--------|------------------------------------------------------------------------------------------|
| Week 1 | Introduction to Big Data: Volume, Velocity, Variety, Veracity, Value; Ecosystem Overview |



جمهورية العراق - وزارة التعليم العالي والبحث العلمي  
اسم الجامعة  
بكالوريوس في الذكاء الاصطناعي / البيانات الضخمة (الدورة الأولى)  
أربع سنوات (ثمانية فصول دراسية) - ٢٤٠ وحدة ائتمانية  
كل وحدة ائتمانية = ٢٥ ساعة



|                |                                                                              |
|----------------|------------------------------------------------------------------------------|
| <b>Week 2</b>  | Distributed Storage Systems: HDFS Architecture, Replication, Fault Tolerance |
| <b>Week 3</b>  | Hadoop Ecosystem and YARN: Cluster Architecture, Resource Management         |
| <b>Week 4</b>  | MapReduce Programming Model: Map/Reduce Phases, Job Execution                |
| <b>Week 5</b>  | MapReduce (cont'd): Advanced Patterns, Optimization                          |
| <b>Week 6</b>  | Apache Spark Fundamentals: RDDs, Transformations and Actions                 |
| <b>Week 7</b>  | Mid-term Exam and Spark DataFrames                                           |
| <b>Week 8</b>  | Spark SQL and Data Processing: Structured Queries, Optimization              |
| <b>Week 9</b>  | NoSQL Databases: Key-Value and Document Stores (MongoDB)                     |
| <b>Week 10</b> | NoSQL Databases (cont'd): Column-Family and Graph Stores (Cassandra, HBase)  |
| <b>Week 11</b> | Data Ingestion and Streaming: Kafka, Batch vs. Real-Time Processing          |
| <b>Week 12</b> | Data Warehousing with Hive Architecture and HiveQL                           |
| <b>Week 13</b> | Big Data on Cloud Platforms: AWS/Azure/GCP Services                          |
| <b>Week 14</b> | Big Data Analytics and ML at Scale: Spark MLlib                              |
| <b>Week 15</b> | Integrative Project and Case Studies: Pipeline Design and Evaluation         |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>                                |

### Delivery Plan (Weekly Lab. Syllabus)

#### المنهاج الاسبوعي للمختبر

|                | Material Covered                                                           |
|----------------|----------------------------------------------------------------------------|
| <b>Week 1</b>  | Lab 1: Setting Up a Hadoop Single-Node Cluster                             |
| <b>Week 2</b>  | Lab 2: Working with HDFS: File Operations and Replication                  |
| <b>Week 3</b>  | Lab 3: Writing and running a MapReduce Job (Word Count)                    |
| <b>Week 4</b>  | Lab 4: Advanced MapReduce: Custom Mappers and Reducers                     |
| <b>Week 5</b>  | Lab 5: Introduction to Apache Spark: RDDs and Transformations              |
| <b>Week 6</b>  | Lab 6: Spark DataFrames and Spark SQL                                      |
| <b>Week 7</b>  | Lab 7: NoSQL Database Practice: MongoDB (Document Store)                   |
| <b>Week 8</b>  | Lab 8: NoSQL Database Practice: Cassandra/HBase (Column-Family Store)      |
| <b>Week 9</b>  | Lab 9: Building a Streaming Pipeline with Kafka                            |
| <b>Week 10</b> | Lab 10: Data Warehousing with Hive: Writing HiveQL Queries                 |
| <b>Week 11</b> | Lab 11: Integrative Project Lab: End-to-End Pipeline Implementation Part 1 |
| <b>Week 12</b> | Lab 12: Integrative Project Lab: End-to-End Pipeline Implementation Part 2 |



### Learning and Teaching Resources

#### مصادر التعليم والتعلم

|                   | Text                                                                                                                                                         | Available in the Library? |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Required Texts    | Hadoop: The Definitive Guide, Tom White, O'Reilly Media                                                                                                      | Yes                       |
| Recommended Texts | Learning Spark: Lightning-Fast Data Analytics, Jules Damji et al., O'Reilly Media<br>Designing Data-Intensive Applications, Martin Kleppmann, O'Reilly Media | No                        |
| Websites          | <a href="https://www.coursera.org/specializations/big-data">https://www.coursera.org/specializations/big-data</a>                                            |                           |

### Grading Scheme

#### مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks %  | Definition                            |
|-----------------------------|------------------|---------------------|----------|---------------------------------------|
| Success Group<br>(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<br>(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 with 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: سيتم تقريب العلامات العشرية التي تزيد أو تقل عن ٠,٥ إلى العلامة الكاملة الأعلى أو الأدنى (على سبيل المثال، سيتم تقريب علامة ٥٤,٥ إلى ٥٥، بينما سيتم تقريب علامة ٥٤,٤ إلى ٥٤). لدى الجامعة سياسة لا تسمح بـ "حالات الرسوب القريبة من النجاح"، لذا فإن التعديل الوحيد للعلامات الممنوحة من قبل المصححين الأصليين سيكون التقريب التلقائي الموضح أعلاه.



امسح الكود للوصول إلى النسخة الإلكترونية