MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

| **Module Information**  **معلومات المادة الدراسية** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Module Title** | Applied Bioinformatics | | | | **Module Delivery** | | |
| **Module Type** | Core | | | | * **☒ Theory** * **☐ Lecture** * **☒ Lab** * **☐ Tutorial** * **☐ Practical** * **☐ Seminar** | | |
| **Module Code** | ITC320080 | | | |
| **ECTS Credits** | 5.00 | | | |
| **SWL (hr/sem)** | 125 | | | |
| **Module Level** | | 2 | **Semester of Delivery** | | | | 3 |
| **Administering Department** | | BID | **College** | BMIC | | | |
| **Module Leader** | Maysaa Ahmed Abdulkaremm | | **e-mail** | maysaa.ahmed-bic@uoitc.edu.iq | | | |
| **Module Leader’s Acad. Title** | | Assistant Lecturer | **Module Leader’s Qualification** | | | | MSc |
| **Module Tutor** | Name (if available) | | **e-mail** | E-mail | | | |
| **Peer Reviewer Name** | | jwan k alwan | **e-mail** | jwanism@uiotc.edu.iq | | | |
| **Scientific Committee Approval Date** | | 18/06/2023 | **Version Number** | | | 1.0 | |

| **Relation with other Modules**  **العلاقة مع المواد الدراسية الأخرى** | | | |
| --- | --- | --- | --- |
| **Prerequisite module** | Introduction to Bioinformatics / BID122 | **Semester** | 2 |
| **Co-requisites module** | None | **Semester** |  |

| **Module Aims, Learning Outcomes and Indicative Contents**  **أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** | |
| --- | --- |
| **Module Aims**  **أهداف المادة الدراسية** | 1. To expose students to theoretical and analytical aspects in the field of bioinformatics. 2. To understand the role of the bioinformatics software and how to use them. 3. To understand Databases and Sequence alignment 4. Grounds students in the research process, from concept utilization and design of the project to its execution and dissemination and discussion of its findings. 5. To assist students to become independent researchers and develop professional attitudes and skills. |
| **Module Learning Outcomes**  **مخرجات التعلم للمادة الدراسية** | 1. Learn the genome and how to align various sequences. 2. Capable of comprehending the four levels of protein. 3. Learn how to discuss the many forms of pf interactions. 4. Capable of using bioinformatics tools for structure prediction and visualization. |
| **Indicative Contents**  **المحتويات الإرشادية** | Indicative content includes the following:   1. Introduction to Bioinformatics:    * Overview of bioinformatics and its applications in biology and medicine    * Introduction to biological databases and resources    * Basics of sequence analysis 2. Biological Databases and Tools:    * Sequence databases: GenBank, UniProt, RefSeq    * Structure databases: Protein Data Bank (PDB)    * Nucleotide and protein sequence analysis tools: BLAST, FASTA    * Multiple sequence alignment tools: ClustalW, MUSCLE 3. Proteins (Structures of molecules (Primary, and secondary ..etc) 4. Protein - protein interactions + Protein - ligands interactions 5. Protein structural visualization |
|  |  |

| **Learning and Teaching Strategies**  **استراتيجيات التعلم والتعليم** | |
| --- | --- |
| **Strategies** | 1. Lectures: Traditional lectures can be used to introduce theoretical concepts and provide an overview of the field. Lectures should be clear, engaging, and supplemented with visual aids such as slides, diagrams, and animations to enhance understanding. 2. Hands-on Exercises: Practical sessions are crucial for learning bioinformatics. Students should have access to computers and bioinformatics software/tools to perform data analysis tasks. Guided exercises and tutorials can be provided to teach specific techniques, algorithms, and software usage. 3. Group Discussions and Problem Solving: Encourage students to actively participate in group discussions and problem-solving activities. This can involve analyzing and interpreting bioinformatics results, discussing research papers, and brainstorming solutions to challenges in bioinformatics analysis. 4. Online Resources and Tutorials: Encourage students to explore online bioinformatics resources, tutorials, and forums |

| **Student Workload (SWL)**  **الحمل الدراسي للطالب** | | | |
| --- | --- | --- | --- |
| **Structured SWL (h/sem)**  **الحمل الدراسي المنتظم للطالب خلال الفصل** | 63 | **Structured SWL (h/w)**  **الحمل الدراسي المنتظم للطالب أسبوعيا** | 4 |
| **Unstructured SWL (h/sem)**  **الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 62 | **Unstructured SWL (h/w)**  **الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 4 |
| **Total SWL (h/sem)**  **الحمل الدراسي الكلي للطالب خلال الفصل** | 125 | | |

| **Module Evaluation**  **تقييم المادة الدراسية** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **As** | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 10% (10) | 3, 10 | LO #1 and 2. |
| **Assignments** | 2 | 10% (10) | 5, 11 | LO # 1, 2 and 3. |
| **Projects / Lab.** | 1 | 10% (10) | Continuous |  |
| **Report** | 1 | 10% (10) | 13 | LO # 1, 2 and 3. |
| **Summative assessment** | **Midterm Exam** | 2 hr | 10% (10) | 7 | LO # 1, 2 and 3 |
| **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) |  |  |

| **Delivery Plan (Weekly Syllabus)**  **المنهاج الاسبوعي النظري** | |
| --- | --- |
| **Week** | **Material Covered** |
| **Week 1** | Introduction to Bioinformatics |
| **Week 2** | Biological Databases and Tools |
| **Week 3** | Sequence Alignment tools |
| **Week 4-5** | Construction of Phylogenetic tree & tools |
| **Week 6-7** | Proteins (Structures of molecules (Primary, and secondary ..etc) |
| **Week 8-9** | Prediction of protein secondary structure from amino acid sequences & tools |
| **Week 10-11** | Protein - protein interactions + Protein - ligands interactions |
| **Week 12-15** | Protein structural visualization |

| **Delivery Plan (Weekly Lab. Syllabus)**  **المنهاج الاسبوعي للعملي** | |
| --- | --- |
| **Week** | **Material Covered** |
| **Week 1-2** | Clastal W software |
| **Week 3-4** | Pyre 2 web server |
| **Week 5-6** | PyMOL Molecular Graphics System |
| **Week 7-8** | Swiss pdb viewer (SPDV) |
| **Week 9-11** | UCSF chimera software & Avogadro (molecular editor and visualizer) software |
| **Week 12** | LigPlot+ software |
| **Week 13-15** | Discovery studio visualizer software |

| **Learning and Teaching Resources**  **مصادر التعلم والتدريس** | | |
| --- | --- | --- |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | Edwards, D., Stajich, J., & Hansen, D. (Eds.). (2009). *Bioinformatics: tools and applications*. springer science & business media. | No |
| **Recommended Texts** | Baxevanis, A. D., Bader, G. D., & Wishart, D. S. (Eds.). (2020). *Bioinformatics*. John Wiley & Sons.  Behzadi, P., & Bernabò, N. (Eds.). (2020). *Computational Biology and Chemistry*. BoD–Books on Demand. | No |
| **Websites** | https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering | |

| **Grading Scheme**  **مخطط الدرجات** | | | | |
| --- | --- | --- | --- | --- |
| **Group** | **Grade** | التقدير | **Marks (%)** | **Definition** |
| **Success Group**  **(50 - 100)** | **A -** Excellent | **امتياز** | 90 - 100 | Outstanding Performance |
| **B -** Very Good | **جيد جدا** | 80 - 89 | Above average with some errors |
| **C -** Good | **جيد** | 70 - 79 | Sound work with notable errors |
| **D -** Satisfactory | **متوسط** | 60 - 69 | Fair but with major shortcomings |
| **E -** Sufficient | **مقبول** | 50 - 59 | Work meets minimum criteria |
| **Fail Group**  **(0 – 49)** | **FX –** Fail | **راسب (قيد المعالجة)** | (45-49) | More work required but credit awarded |
| **F –** Fail | **راسب** | (0-44) | Considerable amount of work required |
|  |  |  |  |  |
| **Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. | | | | |