MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

| **Module Information**  **معلومات المادة الدراسية** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Module Title** | Image processing | | | | **Module Delivery** | | |
| **Module Type** | Core | | | | * **☒ Theory** * **☐ Lecture** * **☒ Lab** * **☐ Tutorial** * **☐ Practical** * **☐ Seminar** | | |
| **Module Code** | BMI312 | | | |
| **ECTS Credits** | 5.00 | | | |
| **SWL (hr/sem)** | 125 | | | |
| **Module Level** | | UGx1 3 | **Semester of Delivery** | | | | 5 |
| **Administering Department** | | BID | **College** | BMIC | | | |
| **Module Leader** | Wasan Maddah Alalousi | | **e-mail** | E-mail [wamalousi@uoitc.edu.iq](mailto:wamalousi@uoitc.edu.iq) | | | |
| **Module Leader’s Acad. Title** | | Assistant Lecture | **Module Leader’s Qualification** | | | | MSc. |
| **Module Tutor** | Name (if available) | | **e-mail** |  | | | |
| **Peer Reviewer Name** | | omar A. M | **e-mail** | omara.m@uoitc.edu.iq | | | |
| **Scientific Committee Approval Date** | | 18/06/2023 | **Version Number** | | | 1.0 | |

| **Relation with other Modules**  **العلاقة مع المواد الدراسية الأخرى** | | | |
| --- | --- | --- | --- |
| **Prerequisite module** | Data Analysis and Visualization / BID225 | **Semester** | 4 |
| **Co-requisites module** | None | **Semester** |  |

| **Module Aims, Learning Outcomes and Indicative Contents**  **أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** | |
| --- | --- |
| **Module Aims**  **أهداف المادة الدراسية** | Our courses are designed for student looking to specialize in a range of fields, including: Computed tomography, MRI, Hybrid imaging (PET & SPECT/CT or PET/MR) Radiographic image interpretation, Breast imaging, Research studies  1. To giving student diverse experience and skills that ensure graduate career-ready and eligible for registration as a medical programmer  2. This course initiates the techniques skills based developmental of the Medical Imaging Professional  3. to progressing through the various stages of novice to expert culminating on completion in registration and licensed practice.  4. Students are also introduced to the essential ethics, medical images-legal issues,  5. To develop problem solving skills and understanding of medical images processing theory through the application of different techniques.  6. To understand principles of medical imaging |
| **Module Learning Outcomes**  **مخرجات التعلم للمادة الدراسية** | 1. Define how medical imaging devices work. 2. List the various terms associated with medical imaging. 3. Discuss the properties of medical images and contrast different types of medical imaging   3. Summarize the basic principles of medical image processing.  5. Identify the basic stages for process the medical images  6. Describe the used techniques to processing the medical images.  7. Discuss the algorithms of medical images processing.   1. Analysis the output of processing the medical images |
| **Indicative Contents**  **المحتويات الإرشادية** | Indicative content includes the following.  Part A - Theory  Types of Medical Imaging, Images preprocessing, Image enhancement, Filtering, edge detection methods, Image Segmentation, Thresholding Method, feature extraction  Revision problem classes.  Part B – practical project  Matlab program.  Components of projects in medical image processing.  GUI and all codes in medical imaging. |

| **Learning and Teaching Strategies**  **استراتيجيات التعلم والتعليم** | |
| --- | --- |
| **Strategies** | Type something like: 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 type of simple experiments involving some sampling activities that are interesting to the students. |

| **Student Workload (SWL)**  **الحمل الدراسي للطالب** | | | |
| --- | --- | --- | --- |
| **Structured SWL (h/sem)**  **الحمل الدراسي المنتظم للطالب خلال الفصل** | 64 | **Structured SWL (h/w)**  **الحمل الدراسي المنتظم للطالب أسبوعيا** | 4 |
| **Unstructured SWL (h/sem)**  **الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 61 | **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 | 5% (10) | 3,5 | LO #1, 2, 7 and 8 |
| **Assignments** | 2 | 5% (10) | 4, 6 | LO # 3, 4, 6 and 7 |
| **Projects / Lab.** | 1 | 15% (10) | Continuous |  |
| **Report** | 1 | 5% (10) | 5-9 | LO # 5, 7 and 8 |
| **Summative assessment** | **Midterm Exam** | 2 hr | 20% (10) | 8 | LO # 1-7 |
| **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 medical image processing and application |
| **Week 2** | Types of Medical Imaging |
| **Week 3** | Images preprocessing |
| **Week 4** | Image enhancement, |
| **Week 5** | types of noise ,Filtering |
| **Week 6** | edge detection methods |
| **Week 7** | Gaussian Smoothing |
| **Week 8** | Mid-term Exam |
| **Week 9** | Image Segmentation, Thresholding Method |
| **Week 10** | Region splitting and merging methods: |
| **Week 11** | Feature extraction |
| **Week 12** | Colors Features Extractions Methods |
| **Week 13** | Boundary Descriptors |
| **Week 14** | Techniques For Features Extraction |
| **Week 15** | Discrete Wavelet Transform (DWT) |

| **Delivery Plan (Weekly Lab. Syllabus)**  **المنهاج الاسبوعي للمختبر** | |
| --- | --- |
| **Week** | **Material Covered** |
| **Week 1** | Part 1/ Lab 1: Introduction to matlab program |
| **Week 2** | Part 2/ Lab 1: Introduction to matlab program |
| **Week 3** | Part 1/ Lab 2: preprocessing image |
| **Week 4** | Part 2/ Lab 2: preprocessing image |
| **Week 5** | Part 1/ Lab 3: filtering the images |
| **Week 6** | Part 2/ Lab 3: filtering the images |
| **Week 7** | Part 1/ Lab 4: histogram equalization |
| **Week 8** | Part 2/ Lab 4: histogram equalization |
| **Week 9** | Part 1/ Lab 4: histogram equalization |
| **Week 10** | Part 2/ Lab 4: histogram equalization |
| **Week 11** | Part 1/ Lab 6: canny edge detection |
| **Week 12** | Part 2/ Lab 6: canny edge detection |
| **Week 13** | Part 1/ Lab 7: Haar wavelet |
| **Week 14** | Part 2/ Lab 7: Haar wavelet |
| **Week 15** | Review |

| **Learning and Teaching Resources**  **مصادر التعلم والتدريس** | | |
| --- | --- | --- |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | Medical Image Processing for Improved Clinical Diagnosis, Medical Information Science Reference, [2019] | No |
| **Recommended Texts** | Digital Image Processing for Medical Applications, GEOFF DOUGHERTY, 2009 | No |
| **Websites** | Handbook of Medical Image Processing and Analysis, 2nd Edition, I.N. Bankman (Ed.), Academic Press, ISBN 0123739047, San Diego, CA, USA, 2008. – 984 p. | |

| **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. | | | | |