

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |                                |                               |                                                                                                                                                                                                                                                                |
|------------------------------------|--------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                |                               |                                                                                                                                                                                                                                                                |
| Module Title                       | Physics of Nuclear Medicine    |                               | Module Delivery                                                                                                                                                                                                                                                |
| Module Type                        | Core                           |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input checked="" type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | MPH 401                        |                               |                                                                                                                                                                                                                                                                |
| ECTS Credits                       | 7                              |                               |                                                                                                                                                                                                                                                                |
| SWL (hr/sem)                       | 175                            |                               |                                                                                                                                                                                                                                                                |
| Module Level                       | UGx11 4                        | Semester of Delivery          |                                                                                                                                                                                                                                                                |
| Administering Department           | Medical Physics                | College                       | College of Applied Medical Sciences                                                                                                                                                                                                                            |
| Module Leader                      | Asst. Lect. Ali Abdul Majeed   | e-mail                        |                                                                                                                                                                                                                                                                |
| Module Leader's Acad. Title        | Asst. Lect                     | Module Leader's Qualification | M.Sc                                                                                                                                                                                                                                                           |
| Module Tutor                       | Asst. Lect. Ali Abdul Majeed   | e-mail                        | E-mail                                                                                                                                                                                                                                                         |
| Peer Reviewer Name                 | Lecturer Dr. Ahmed Musa Jaafar | e-mail                        | <a href="mailto:ahmed.mo@uowa.edu.iq">ahmed.mo@uowa.edu.iq</a>                                                                                                                                                                                                 |
| Scientific Committee Approval Date | 20-10-2026                     | Version Number                | 1.0                                                                                                                                                                                                                                                            |

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



أ.م.د. سجاد حسين نوتل  
٢٠٢٦ / ٢٠٢٧



## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Aims</b><br>أهداف المادة الدراسية                      | <p>This course aims to introduce students to the basic physical principles of medical instruments, explain their applications in diagnosis and treatment, and develop skills in operating, calibrating, and maintaining medical devices safely and accurately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ul style="list-style-type: none"> <li>• A1: Identify the basic components of medical devices.</li> <li>• A2: Understand how these components integrate with the human body to provide complete applications.</li> <li>• A3: Recognize different types of medical devices based on their physical working principles.</li> <li>• A4: Understand how to calibrate devices from a physical perspective.</li> <li>• A5: Learn how to develop, improve, or design future medical devices using physics.</li> <li>• A6: Understand the applications of medical devices with the human body and how to interpret their outputs physically.</li> <li>• A7: Practice using each device to be able to operate it in future professional work.</li> </ul> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <ol style="list-style-type: none"> <li>1. Providing summarized and printed lectures in both paper and electronic formats.</li> <li>2. Presenting lectures using modern display screens to explain and illustrate electronic circuits and solutions.</li> <li>3. Supplying updated resources in a simple style understandable to students.</li> <li>4. Referring to lectures from international universities for comparison with the delivered course level.</li> </ol> <p>Preparing reports on selected important topics.</p>                                                                                                                                                                                                                   |

## Learning and Teaching Strategies

### استراتيجيات التعلم والتعليم

|                   |                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b> | <ul style="list-style-type: none"> <li>• Tests through questions on the previous lecture to ensure continuity and connection with the new lecture.</li> <li>• Short quizzes.</li> <li>• Attendance and class participation.</li> <li>• Homework assignments.</li> <li>• Monthly exams.</li> </ul> <p>Preparing seminars on important topics.</p> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Student Workload (SWL)<br>الحمل الدراسي للطالب                                 |     |                                                                           |     |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|-----|
| <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       | 5.2 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 97  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 6.4 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 175 |                                                                           |     |

| Module Evaluation     |               |             |                |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      |   |
|-----------------------|---------------|-------------|----------------|----------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|---|
| تقييم المادة الدراسية |               |             |                |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      |   |
|                       |               | Time Number | Weight (Marks) | Week Due |    |    |    |    |    |    |    |    |     |     |     |     |     |     | Relevant Learning Outcome |     |     |     |     |     |     |     |     |      |   |
|                       |               |             |                | W1       | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 | W15 | L01                       | L02 | L03 | L04 | L05 | L06 | L07 | L08 | L09 | L010 |   |
| Formative             | Quizzes       | 2           | 10%            |          |    |    |    | X  |    |    |    |    |     | X   |     |     |     |     |                           |     |     |     |     | X   |     |     |     |      |   |
|                       | Report        | 1           | 5%             |          |    |    |    |    |    |    |    |    |     |     |     |     | X   |     |                           |     | X   |     |     |     |     |     |     |      |   |
|                       | Lab Report    | 1           | 5%             |          |    |    |    |    |    |    |    |    |     |     |     |     |     | X   |                           |     | X   |     |     |     |     |     |     |      |   |
|                       | Project       | -           | -              |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      |   |
|                       | Online Assig. | 2           | 10%            |          |    |    |    |    | X  |    |    |    |     |     | X   |     |     |     | X                         |     |     |     |     |     | X   |     |     |      |   |
|                       | Onsite Assig. | 1           | 10%            |          |    |    |    |    |    |    |    |    |     | X   |     |     |     |     | X                         |     |     |     |     |     |     |     |     |      |   |
|                       | Seminar       | -           | -              |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      |   |
| Summative             | Mid. Exam     | 1hr         | 10% (10)       |          |    |    |    |    | X  |    |    |    |     |     |     |     |     |     |                           | X   | X   |     |     |     |     |     |     |      |   |
|                       | Final Exam    | 3hr         | 50% (50)       | Week 16  |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      | X |
| Total assessment      |               |             | 100%           |          |    |    |    |    |    |    |    |    |     |     |     |     |     |     |                           |     |     |     |     |     |     |     |     |      |   |

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

|         | Material Covered                 |
|---------|----------------------------------|
| Week 1  | introduction                     |
| Week 2  | Biopotential Electrodes          |
| Week 3  | Electrodes Theory                |
| Week 4  | Types of Electrodes              |
| Week 5  | Biomedical Sensors               |
| Week 6  | Types of Biomedical Sensors      |
| Week 7  | X-ray physics                    |
| Week 8  | Defibrillator                    |
| Week 9  | First Seasonal Exam              |
| Week 10 | Pacemaker                        |
| Week 11 | Computer Tomography (CT)         |
| Week 12 | Magnetic Resonance Imaging (MRI) |
| Week 13 | Radiation (Computed Tomography)  |
| Week 14 | Electroencephalogram (EEG)       |
| Week 15 | Second Seasonal Exam             |

### الخطة التدريسية (المنهاج الأسبوعي للمختبر)

| الأسبوع | المادة العلمية المغطاة                                      |
|---------|-------------------------------------------------------------|
| Week1   | Preparation of Thermoplastic Moulds                         |
| Week2   | Nuclear Binding Energy                                      |
| Week3   | Fabrication of a Custom Block for Photon and Electron Beams |
| Week4   | Immobilization Devices                                      |
| Week5   | Beam-Modifying Devices                                      |
| Week6   | Performing 3D Conformal Radiotherapy for the Head and Neck  |
| Week7   | Midterm Examination                                         |
| Week8   | Performing 3D Conformal Radiotherapy for the Chest          |

|               |                                                                 |
|---------------|-----------------------------------------------------------------|
| <b>Week9</b>  | Performing 3D Conformal Radiotherapy for the Abdomen and Pelvis |
| <b>Week10</b> | Performing Spinal Cord Irradiation (SCI)                        |
| <b>Week11</b> | Intensity-Modulated Radiation Therapy (IMRT) Procedures         |
| <b>Week12</b> | Volumetric Modulated Arc Therapy (VMAT) Procedures              |
| <b>Week13</b> | Tools Used in High-Dose-Rate (HDR) Brachytherapy                |
| <b>Week14</b> | Performing High-Dose-Rate (HDR) Brachytherapy                   |
| <b>Week15</b> | Preparation of an Intracavitary Brachytherapy Mould             |

### Learning and Teaching Resources

مصادر التعلم والتدريس

|                          | Text                                                         | Available in the Library? |
|--------------------------|--------------------------------------------------------------|---------------------------|
| <b>Required Texts</b>    | Elements of Nuclear Physics, Walter E. Meyerhof              | Yes                       |
| <b>Recommended Texts</b> | INTRODUCTORY NUCLEAR PHYSICS Kenneth S. Krane                | No                        |
| <b>Websites</b>          | Introduction to Nuclear Physics by R. R. Roy and B. P. Nigam |                           |

### 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 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.