

**TISHK INTERNATIONAL UNIVERSITY  
FACULTY OF APPLIED SCIENCE  
Department of PHYSIOTHERAPY,  
2022-2023 Fall**

**Course Information for PT 101 APPLIED MEDICAL PHYSICS**

|  |                         |  |                  |                |             |  |
|--|-------------------------|--|------------------|----------------|-------------|--|
| <b>Course Name:</b>                          |                         | APPLIED MEDICAL PHYSICS  |                  |                |             |  |
| <b>Code</b>                                  | <b>Regular Semester</b> | <b>Theoretical</b>   | <b>Practical</b> | <b>Credits</b> | <b>ECTS</b> |  |
| PT 101                                       | 1                       | 2  | 3                | 4              | 5           |  |
| <b>Name of Lecturer(s):</b>                  |                         | Runak Tahr Ali   |                  |                |             |  |
| <b>Teaching Assistant:</b>                   |                         | Dr.Ronak Taher Ali   |                  |                |             |  |
| <b>Course Language:</b>                      |                         | english  |                  |                |             |  |
| <b>Course Type:</b>                          |                         | Main   |                  |                |             |  |
| <b>Office Hours</b>                          |                         | Thursday   |                  |                |             |  |
| <b>Contact Email:</b>                        |                         | runak.tahr@tiu.edu.iq<br>Tel:07504964534   |                  |                |             |  |
| <b>Teacher's academic profile:</b>           |                         | PhD  |                  |                |             |  |
| <b>Course Objectives:</b>                    |                         | The most important application of physics in medicine involves: 1- The field of radiology. 2- Physics principle of instruments used in medical diagnosis and therapy. 3-Nuclear medicine used in medical diagnosis and therapy. 4-Radiation protection in medicine.  |                  |                |             |  |
| <b>Course Description (Course overview):</b> |                         | Medical Physics is a branch of applied physics which employs physical concepts for the prevention, diagnosis and treatment of human disease. It is a truly diverse field that utilizes the knowledge gained in other areas of physics and applies it to heal people. |                  |                |             |  |

**COURSE CONTENT**

| <b>Week</b> | <b>Hour</b> | <b>Date</b>   | <b>Topic</b>                                 |
|-------------|-------------|---------------|--|
| 1           | 2           | 1-5/1/2023    | Terminology& Analog measurements in medicine |
| 2           | 2           | 8-12/1/2023   | Heat Therapy                                 |
| 3           | 2           | 15-19/1/2023  | Physics of Diagnostic X-Rays and - Part I    |
| 4           | 2           | 22-26/1/2023  | Physics of Diagnostic X-Rays and - Part I    |
| 5           | 2           | 29/1-2/2/2023 | Midterm Exam                                 |
| 6           | 2           | 5-9/2/2023    | Ultrasound in Medicine                       |
| 7           | 2           | 12-16/2/2023  | Radiation Protection                         |
| 8           | 2           | 19-23/2/2023  | MRI (Magnetic Resonance Imaging )            |
| 9           | 2           | 26/2-2/3/2023 | Final Exam                                   |
| 10          | 2           | 5-9/3/2023    | Final Exam                                   |

**COURSE/STUDENT LEARNING OUTCOMES**

- 1 1. Describing the early stages of medical physics.
- 2 2. Analyze technologies designed to introduce energy into tissues.
- 3 3. Understand key concepts specific to energy deposition for both ionizing photon interactions and transport in matter.
- 4 4. Learn the physics and technology of medical imaging system and the design parameters that determine image contrast, noise, spatial resolution, and patient radiation dose.
- 5 5. Apply a knowledge of modern treatment planning x-ray systems and physics to analyze physical methods behind dose planning and energy transport in tissue and apply this knowledge to perform theoretical dose calculations with the appropriate software

**COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES**

(Blank : no contribution, I: Introduction, P: Profecient, A: Advanced )

| <b>Program Learning Outcomes</b>                           |  | <b>Cont.</b>  |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
|--|--|---------------|--|------|--------|---|---|------------|-----------------------------------|---|---|-------------|--|---|---|--------------|--------------------------|---|---|--------------|--|---|---|---------------|--------------------------|---|---|------------|---|---|---|--------------|--------------------------|---|---|--------------|--------------------------------------|---|---|---------------|--------------------------|----|---|------------|------------------------------|--|
| 1  | 1. Demonstrate knowledge of the underlying concepts and principles associated within the context of health.  | I             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 2  | Demonstrate an ability to present, evaluate and interpret qualitative and quantitative data to develop lines of argument and make sound judgments in accordance with basic theories and concepts relevant to health.   | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 3  | 3. Evaluate the appropriateness of different approaches to solving problems related to health.   | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 4  | 4. Asses the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility.  | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 5  | 5. Apply knowledge and critical understanding of the principles of health and the way in which these have developed  | A             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 6  | Demonstrate an ability to apply underlying concepts and principles outside the context in which they were first studied.   | A             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 7  | Use a range of established techniques to initiate and undertake critical analysis of information, and to propose solutions to problems arising from that analysis  | A             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 8  | 8. Work as a member of the multi-disciplinary team within diverse settings providing an inter-agency and cross-boundary approach to person-centered health and social care.  | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 9  | 9. Demonstrate personal transferable key skills in problem solving, critical thinking, written and verbal communication, team working, professional autonomy.  | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 10   | Demonstrate knowledge and understanding of human function and dysfunction, the theory and practice of physiotherapy.   | P             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 11   | Develop clinical reasoning and problem-solving skills to assess problems and plan interventions to meet service user and career goals.   | A             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 12   | Apply therapeutic skills in response to the physical, psychological, social and cultural needs of individuals or groups using critical evaluation of the available evidence  | A             |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| <b>Prerequisites (Course Reading List and References):</b> | 1. Medical physics (John R. Cameron) 1978 ,1993,1999,2003 and 2021 3. Introduction to physics in modern medicine (Suzanne A. kane) 2010 4. Electronics in medicine and biomedical instrumentation (Nandini K. Jog) 2006 5. Radiation protection and dosimetry (Michel G. Stabin) 2023 6. Dr.R.N.Roy .Atext book of Biophysics 1st edition,2005 7- Physics of radiotherapy Khan 2022  |               |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| <b>Student's obligation (Special Requirements):</b>        | Midterm exam report Quiz Attendance  |               |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| <b>Weekly Laboratory/Practice Plan:</b>                    | <table border="1"> <thead> <tr> <th>Week</th> <th>Hour</th> <th>Date</th> <th>Topics</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>1-5/1/2023</td> <td>1 -Practical -how to write report</td> </tr> <tr> <td>2</td> <td>3</td> <td>8-12/1/2023</td> <td>2- Practice-Application Of visible light</td> </tr> <tr> <td>3</td> <td>3</td> <td>15-19/1/2023</td> <td>3- Prepare report + Quiz</td> </tr> <tr> <td>4</td> <td>3</td> <td>22-26/1/2023</td> <td>4- Practice-Application of Ultraviolet in Medicine</td> </tr> <tr> <td>5</td> <td>3</td> <td>29/1-2/2/2023</td> <td>5- Prepare report + Quiz</td> </tr> <tr> <td>6</td> <td>3</td> <td>5-9/2/2023</td> <td>6- Practice-principles of radiofrequency.</td> </tr> <tr> <td>7</td> <td>3</td> <td>12-16/2/2023</td> <td>7- Prepare report + Quiz</td> </tr> <tr> <td>8</td> <td>3</td> <td>19-23/2/2023</td> <td>8- practical - Application Of LASER.</td> </tr> <tr> <td>9</td> <td>3</td> <td>26/2-2/3/2023</td> <td>9- Prepare report + Quiz</td> </tr> <tr> <td>10</td> <td>3</td> <td>5-9/3/2023</td> <td>10- practical - Hearing test</td> </tr> </tbody> </table> | Week          | Hour   | Date | Topics | 1 | 3 | 1-5/1/2023 | 1 -Practical -how to write report | 2 | 3 | 8-12/1/2023 | 2- Practice-Application Of visible light | 3 | 3 | 15-19/1/2023 | 3- Prepare report + Quiz | 4 | 3 | 22-26/1/2023 | 4- Practice-Application of Ultraviolet in Medicine | 5 | 3 | 29/1-2/2/2023 | 5- Prepare report + Quiz | 6 | 3 | 5-9/2/2023 | 6- Practice-principles of radiofrequency. | 7 | 3 | 12-16/2/2023 | 7- Prepare report + Quiz | 8 | 3 | 19-23/2/2023 | 8- practical - Application Of LASER. | 9 | 3 | 26/2-2/3/2023 | 9- Prepare report + Quiz | 10 | 3 | 5-9/3/2023 | 10- practical - Hearing test |  |
| Week   | Hour   | Date          | Topics   |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 1  | 3  | 1-5/1/2023    | 1 -Practical -how to write report                  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 2  | 3  | 8-12/1/2023   | 2- Practice-Application Of visible light           |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 3  | 3  | 15-19/1/2023  | 3- Prepare report + Quiz                           |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 4  | 3  | 22-26/1/2023  | 4- Practice-Application of Ultraviolet in Medicine |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 5  | 3  | 29/1-2/2/2023 | 5- Prepare report + Quiz                           |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 6  | 3  | 5-9/2/2023    | 6- Practice-principles of radiofrequency.          |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 7  | 3  | 12-16/2/2023  | 7- Prepare report + Quiz                           |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 8  | 3  | 19-23/2/2023  | 8- practical - Application Of LASER.               |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 9  | 3  | 26/2-2/3/2023 | 9- Prepare report + Quiz                           |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| 10   | 3  | 5-9/3/2023    | 10- practical - Hearing test                       |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |
| <b>Course Book/Textbook:</b>                               | 1. Medical physics (John R. Cameron) 1978 ,1993,1999,2003 and 2021 3. Introduction to physics in modern medicine (Suzanne A. kane) 2010 4. Electronics in medicine and biomedical instrumentation (Nandini K. Jog) 2006 5. Radiation protection and dosimetry (Michel G. Stabin) 2023 6. Dr.R.N.Roy .Atext book of Biophysics 1st edition,2005 7- Physics of radiotherapy Khan 2022  |               |  |      |        |   |   |            |                                   |   |   |             |  |   |   |              |                          |   |   |              |  |   |   |               |                          |   |   |            |   |   |   |              |                          |   |   |              |                                      |   |   |               |                          |    |   |            |                              |  |

|  |  |                                       |                       |
|--|--|---------------------------------------|-----------------------|
| <b>Other Course Materials/References:</b>  | Video links Case study Hospital Training                                     |                                       |                       |
| <b>Teaching Methods (Forms of Teaching):</b>   | Lectures, Practical sessions, Exercises, Seminar, Project, Case studies, , , |                                       |                       |
| <b>COURSE EVALUATION CRITERIA</b>  |  |                                       |                       |
| <b>Method</b>  | <b>Quantity</b>  | <b>Percentage (%)</b>                 |                       |
| Attendance   | 1  | 5                                     |                       |
| Quiz   | 2  | 5                                     |                       |
| Homework   | 1  | 5                                     |                       |
| Laboratory   | 1  | 10                                    |                       |
| Final Exam   | 1  | 40                                    |                       |
| <b>Total</b>   |  | <b>70</b>                             |                       |
| <b>Examinations:</b> Essay Questions, Fill in the Blanks, Multiple Choices, Short Answers, Matching, , , |  |                                       |                       |
| <b>Extra Notes:</b>  |  |                                       |                       |
| <b>ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD</b>  |  |                                       |                       |
| <b>Activities</b>  | <b>Quantity</b>  | <b>Workload Hours for 1 quantity*</b> | <b>Total Workload</b> |
| Theoretical Hours  | 10   | 2                                     | 20                    |
| Practical Hours  | 10   | 3                                     | 15                    |
| Final Exam   | 1  | 40                                    | 40                    |
| Attendance   | 1  |                                       | 0                     |
| Quiz   | 2  |                                       | 0                     |
| Homework   | 1  |                                       | 0                     |
| Laboratory   | 1  |                                       | 0                     |
| <b>Total Workload</b>  |  |                                       | <b>75</b>             |
| <b>ECTS Credit (Total workload/25)</b>   |  |                                       | <b>3</b>              |

**Peer review**

Signature:

Name:

Lecturer

Signature:

Name:

Head of  
Department

Signature  
:

Name:

Dean