| COURSE INFORMATION | | | | | |
|---|---|---|---|---|---|
| **Course Title** | *Code* | *Semester* | *L+P Hour* | *Credits* | *ECTS* |
| MEDICAL IMAGING PHYSICS | PHYS 523 | 1 | 3 + 0 | 3 | 10 |

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| **Prerequisites** | |

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| **Language of Instruction** | English |
| **Course Level** | Postgraduate |
| **Course Type** | Elective |
| **Course Coordinator** | |
| **Instructors** | Prof.Dr. Avadis Hacınlıyan, Assoc.Prof Ş.İpek Karaaslan |
| **Assistants** | Türkay Toklu |
| **Goals** | To ensure posgraduate students gain expertise in the physics of medical imaging and are able to use the physics principles described for interpreting medical images. |
| **Content** | Probability and statistics, nuclear imaging instrumentation , the physics in radiography, physics principles of fluoroscopy, computed tomography physics, factors affecting image quality, ultrasound imaging, NMR physics and its spectroscopy, radiopharmaceuticals and their utilisation, the physics of the gamma camera, imaging with SPECT, the physics of PET, quality assurance in medical physics, recent advances. |

| **Learning Outcomes** | **Teaching Methods** | **Assessment Methods** |
|---|---|---|
| 1- Has a deep understanding of the utilisation of statistics for medical imaging | 1, 5, 15 | B, C |
| 2- Has gained in-depth practical and technological use of the physics of radiological techniques and their quality assurance in the workplace | 1, 5, 15 | B, C |
| 3-Has expertise in the application of physics to nuclear medicine | 1, 5, 15 | B, C |

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| **Teaching Methods:** | 1: Lecture, 5: Problem solving, 15: Homework |
| **Assessment Methods:** | B: Final, C: Homework |

| COURSE CONTENT | | |
|---|---|---|
| **Week** | **Topics** | **Study Materials** |
| 1 | Probability and statistics | |
| 2 | Instrumentation with nuclear imaging | |
| 3 | Physics of radiography | |
| 4 | Fluoroscopy and its physics basis | |
| 5 | The physics of computed tomography | |
| 6 | Factors affecting image quality | |
| 7 | Ultrasound imaging | |
| 8 | Nuclear magnetic resonance principles and spectroscopy | |
| 9 | Radiopharmaceuticals | |
| 10 | The physics of the Gamma Camera | |
| 11 | Imaging with SPECT | |
| 12 | The physics of PET | |
| 13 | Quality assurance in medical imaging | |
| 14 | Recent advances in physics which will impact medical physicists | |

| RECOMMENDED SOURCES | |
|---|---|
| **Textbook** | **Hendee W.D., "Medical Imaging Physics", Wiley, 2002** |
| **Additional Resources** | |

| MATERIAL SHARING | |
|---|---|
| **Documents** | |
| **Assignments** | 5 |
| **Exams** | 1 final |

| ASSESSMENT | | |
|---|---|---|
| **IN-TERM STUDIES** | **NUMBER** | **PERCENTAGE** |
| Assignment | 5 | 60 |
| **Total** | | 60 |
| **CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE** | | 40 |
| **CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE** | | 60 |
| **Total** | | **100** |

| **COURSE CATEGORY** | Expertise/Field Courses |
|---|---|

| COURSE'S CONTRIBUTION TO PROGRAM | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | Program Learning Outcomes | Contribution | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | |
| 1 | Gains the ability to apply the knowledge in physics and mathematics | | | | | X | |
| 2 | Gains the ability to construct an experimental setup, perform the experiment, analyze and interpret the results | | X | | | | |
| 3 | Has the education required for the measurements in scientific and technological areas | | | **X** | | | |
| 4 | Capable of working in an interdisciplinary team | | | | | **X** | |
| 5 | Capable of identifying, formulating and solving medical physics problems | | | | | X | |
| 6 | Conscious of professional and ethical responsibility in their profession | | | | | **X** | |
| 7 | Can communicate actively and effectively | | | | | X | |
| 8 | Has the capabilityto use the knowledge gained to interact and lead medical physics in industrial and hospital situations. Understandsthe social contributions of physics | | | **X** | | | |
| 9 | Conscious about the necessity of lifelong education and can implement it | | | **X** | | | |
| 10 | Awareness of the current investigations and developments in the field of physics and its application to medical imaging | | | | X | | |
| 11 | Can easily utilise the techniques and instrumentation required for physical applications | | | | X | | |

| ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION | | | |
|---|---|---|---|
| Activities | Quantity | Duration (Hour) | Total Workload (Hour) |
| Course Duration (Including the exam week: 14x Total course hours) | 14 | 3 | 42 |
| Hours for off-the-classroom study (Pre-study, practice) | 14 | 12 | 168 |
| Assignment | 5 | 5 | 25 |
| Final examination | 1 | 3 | 3 |
| **Total Work Load** | | | 238 |
| **Total Work Load / 25 (h)** | | | 9,52 |
| **ECTS Credit of the Course** | | | 10 |