University of Gdańsk

# Subject card

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| Subject name and code | Quality Control and Routine and Specialized Tests in PET and SPECT, PG_00210346 | | | | | | |
| Field of study | Medical Physics | | | | | | |
| Date of commencement of studies | October 2025 | | Academic year of realisation of subject | 2026/2027 | | | |
| Education level | Master's studies | | Subject group | Optional subject group<br>Subject group related to scientific research in the field of study | | | |
| Mode of study | full-time studies | | Mode of delivery | at the university | | | |
| Year of study | 2 | | Language of instruction | Polish | | | |
| Semester of study | 4 | | ECTS credits | 3.0 | | | |
| Learning profile | academic | | Assessment form | credit | | | |
| Conducting unit | | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. Anna Synak | | | | |
| | Teachers | | | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 45.0 | 0.0 | 0.0 | 0.0 | 0.0 | 45 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 45 | | 0.0 | | 30.0 | 75 |
| Subject objectives | The aim of this course is to familiarize students with the principles of quality control for nuclear medicine equipment used in PET and SPECT diagnostics. It presents the methods for performing both routine and specialized quality control tests and highlights their importance in ensuring high-quality imaging, patient safety, and diagnostic accuracy. The course also develops students' ability to interpret quality control test results and evaluate the impact of technical device parameters on image quality and the quantitative accuracy of diagnostic examinations. | | | | | | |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
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| [FIZMEDMU2_W06] Knows and understands the current directions of development of physics and medical sciences, especially in the field of medical physics, and the fundamental dilemmas of modern civilisation. | The student understands current developments in quality control methods for nuclear medicine imaging systems and their significance for improving diagnostic quality, patient safety, and quality assurance. | [SW4] test/exam - oral or written |
| [FIZMEDMU2_W01] Knows and understands in depth selected issues in the field of physics and medicine, the complex relationships between them, and development trends in the exact and natural sciences, health sciences, and others. | The student understands the principles of quality control in nuclear medicine, the legal requirements and standards governing PET and SPECT systems, and the significance of quality parameters for diagnostic accuracy and patient safety. | [SW4] test/exam - oral or written |
| [FIZMEDMU2_W04] Knows and understands in depth the theoretical foundations and principles of operation of measurement systems and research, diagnostic and therapeutic equipment specific to the field of physics and medicine. | The student understands the theoretical foundations of measurement methods and the operating principles of the equipment used in the quality control of PET, SPECT, PET/CT, and SPECT/CT systems, as well as the principles of performing and interpreting quality control tests and imaging performance measurements. | [SW4] test/exam - oral or written |
| [FIZMEDMU2_K03] He is ready to take a scientific approach to the issues being solved, using scientific literature, as well as expert opinions, in case of difficulties in solving the problem on his own. | The student is prepared to critically evaluate the results of quality control tests performed on nuclear medicine imaging systems and to apply current standards, guidelines, and scientific evidence in quality assurance practice. | [SK4] test/exam - oral or written |
| [FIZMEDMU2_W07] Knows and understands the principles of occupational health and safety to a degree that allows for independent work in medical facilities and research laboratories. | The student understands the principles of safe practice, as well as the legal and organizational requirements governing quality control testing of PET and SPECT systems, documentation of test results, and quality assurance procedures in nuclear medicine departments. | [SW4] test/exam - oral or written |

## Subject contents

- Fundamentals of quality control in nuclear medicine.
- Legal requirements and standards related to quality control of PET and SPECT systems.
- Characteristics of quality parameters of PET and SPECT imaging systems.
- Acceptance, commissioning, and routine performance tests.
- Quality control of gamma cameras and SPECT systems.
- Uniformity, spatial resolution, linearity, and sensitivity testing.
- Quality control of PET systems.
- Calibration, normalization, and attenuation correction tests.
- Measurement of spatial resolution, sensitivity, and quantitative image quality in PET imaging.
- Phantoms used for quality control in PET and SPECT.
- Testing of hybrid PET/CT and SPECT/CT systems.
- Artifacts in PET and SPECT imaging and methods for their identification.
- Documentation of quality control results.
- Analysis of test results and acceptance criteria.
- Practical aspects of quality assurance in a nuclear medicine department.

## Prerequisites and co-requisites

None

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
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| test | 51.0% | 100.0% |

## Recommended reading

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| Basic literature | • Rozporządzenie Ministra Zdrowia w sprawie warunków bezpiecznego stosowania promieniowania jonizującego dla wszystkich rodzajów ekspozycji medycznej.<br>• Rozporządzenie Ministra Zdrowia w sprawie testów eksploatacyjnych urządzeń radiologicznych oraz wzorcowych testów eksploatacyjnych.<br>• Quality Assurance for PET and PET/CT System STI/PUB/1393 ISBN 978-92-0-103609-4 |
| Supplementary literature | none |
| eResources addresses | |

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| Example issues/ example questions/ tasks being completed | |
| Work placement | Not applicable |

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