

Course syllabus - Draft

Semester 11 – Elective advanced and broadening course, 7.5 credits

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General information

Course code	2LA211
Course name	Precision medicine cancer diagnostics
Credits	7.5 credits
Form of education	Higher education, study regulation of 2007
Main field of study	Medicine
Level	AV – Second cycle
Grading scale	Fail (U) or Pass (G)
Department responsible	Department of Laboratory Medicine (LabMed)
Deciding body	Programme Committee for the Medical Programme

Specific entry requirements

A passing grade in semesters 1–10 is required.

A student who has failed workplace-based learning (VFU) or equivalent due to serious deficiencies in knowledge, skills, or professional conduct that have jeopardized patient safety or public trust in healthcare is eligible for a new VFU opportunity only once the individual action plan has been completed.

Aims

The course aims to provide students with advanced knowledge, skills, and a critical approach within precision medicine cancer diagnostics, with particular focus on modern radiological techniques, omics technologies, advanced image analysis, and the integration of AI technologies into clinical diagnostics.

Learning outcomes

The learning outcomes (3–5 related to knowledge and understanding and 1–5 related to skills and abilities) are aligned with the national learning objectives for the medical degree as stated in the Swedish Higher Education Ordinance (SFS 1993:100). Learning outcomes related to knowledge and understanding are categorized according to the SOLO taxonomy (S2–S5), and learning outcomes related to skills and abilities are categorized according to Miller's pyramid (M3–M4).

Knowledge and understanding

- explain the value of multimodal radiology, including advanced image analysis and radiomics, in cancer diagnostics and follow-up (SOLO 4)

- describe the principles of precision diagnostics using omics technologies (genomics, transcriptomics, proteomics) and their clinical applications (SOLO 4)
- analyze opportunities and limitations of integrating advanced methods for diagnostic data analysis (AI, bioinformatics, theranostics) into clinical decision-making (SOLO 5)

Skills and abilities

- describe basic analyses of genomic data and identify and interpret genetic variations with clinical relevance for diagnosis and treatment (Miller 2; EPA 1)
- apply methods for advanced image analysis and radiomics in the review and interpretation of diagnostic imaging material (Miller 3; EPA 2)
- independently conduct and orally and in writing present a scientific project within precision diagnostics in cancer, focusing on pathology, radiology, neuroradiology, or nuclear medicine (Miller 3; EPA 10)
- effectively communicate and document precision diagnostic results in interprofessional contexts with focus on clinical relevance and decision support (Miller 4; EPA 9)

Approach and professional conduct

- interact with patients, next of kin, fellow students, teachers, and healthcare staff in a respectful, empathetic, and professional manner (Miller 4)
- reflect on ethical, practical, and medical consequences of AI-based diagnostics, including bias, transparency, and clinical responsibility (Miller 3)
- critically evaluate roles, responsibilities, and collaboration within interprofessional teams working with precision diagnostics (Miller 5)

Course content

The course comprises four weeks of theoretical education and one week of workplace-based learning (VFU). Teaching integrates theory, practical elements according to the EPA framework, and a scientific project. The course covers advanced techniques in multimodal radiology (e.g., 7-Tesla MRI and photon-counting CT), omics technologies, advanced image analysis, and AI integration into clinical cancer diagnostics.

Teaching and learning activities

Student-centred, research-oriented teaching integrating lectures, seminars, workshops, workplace-based learning, and a scientific mini-project. All materials are available via Canvas for self-directed learning.

Examination

The course is examined through several integrated components:

- written examination assessing theoretical knowledge (Pass/Fail)
- interdisciplinary project presentation (oral and written) assessing application of theoretical knowledge (Pass/Fail)
- reflective seminar (oral) assessing ethical and critical reasoning (Pass/Fail)

- summative assessment of clinical skills according to the EPA framework during VFU based on multiple formative assessments and attendance (Pass/Fail)
- continuous assessment of professional conduct; in cases of insufficient achievement an individual action plan is established

To pass the course, a passing grade must be obtained in all components.

Compulsory participation

- course introduction
- workplace-based learning (VFU) according to schedule
- teacher-led skills training
- participation in compulsory formative assessments according to the EPA framework
- submission and oral presentation of a scientific project
- reflective seminar
- ongoing documentation of learning and progression

In case of absence from compulsory components, make-up opportunities or alternative tasks are provided according to instructions from the course director and examiner.

Additional provisions

Language of instruction: Swedish; teaching in English may occur. Swedish and English literature may be used.

Learning portfolio: Documentation supporting student development is continuously collected in the individual learning portfolio.

Course evaluation is conducted in accordance with Karolinska Institutet's guidelines.

Literature and other learning resources

Distributed course material, presentations, and videos.