

## Molecular diagnostics and precision medicine

**Subject area:** Biology/Biomedical Engineering

<b>University:</b>	DTU
<b>Level:</b>	MA all years, PhD
<b>Teaching mode:</b>	hybrid: some students participate online, other students attend real-life
<b>Instructor(s):</b>	Martin Dufva

### Short description

This course aim to give students an insight into molecular diagnostics and the relationship to precision medicine. This includes understanding the medical problem, evaluating the molecular methods applied and predicting the impact of introducing better diagnostics methods on the treatment results. The trends of molecular diagnostics will be analyzed, in particular how diagnostics contribute to giving patients correct treatments.

### Full description

See more on: <https://kurser.dtu.dk/course/22202>

### Learning outcomes

A student who has met the objectives of the course will be able to:

- Describe methods used in molecular diagnostics such as polymerase chain reaction (PCR), real time PCR, sequencing, next generation sequencing, microarrays, digital methods and laboratory automation.
- Compare performance of various quantitative methods such as digital PCR, next generation sequencing and digital ELISA (enzyme-linked immunosorbent assay).
- Evaluate the efficacy of molecular diagnostics to solve a clinical problem.
- Identify weaknesses and limitations of methodologies for a given diagnostics situation.
- Summarize and evaluate current and future technologies for microbial, cancer and genetic diagnostics.
- Describe how molecular diagnostics is guiding the treatment (genetic status used for precision medicine) and preventing diseases (e.g. multiplex analysis for sub classification of microorganism).
- Describe and evaluate the diagnostics used to guide immunotherapy.
- Design a molecular assay including primers and probes, and choose a proper statistically sound validation strategy.
- Present scientific material in clear and precise reports, posters and oral forms.
- Analyse a diagnostic problem and describe a strategy to improve tests by finding new biomarkers (biomarker discovery) or apply other methodology such as point of care- or cutting edge technologies.

## General information

<b>Contact hours per week:</b>	4
<b>Total workload:</b>	9 (in student hours for the whole course)
<b>ECTS credits:</b>	5
<b>Language:</b>	English
<b>Course start date:</b>	31 January 2023
<b>Course end date:</b>	09 May 2023
<b>Add. info about start date:</b>	Exact date depends on the year but varies only a few days from 31/1
<b>Weekly teaching day/time:</b>	Monday 13.00-17.00
<b>Time zone:</b>	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)

## Further information:

<b>Prerequisites:</b>	Molecular or cell biology.
<b>Activities and methods:</b>	Group work, Exercises, Flipped class room teaching
<b>Presence on campus:</b>	Not required

## Final examination

<b>Form:</b>	Individual written report
<b>Date:</b>	
<b>Location/format:</b>	online
<b>Re-sit possibility:</b>	yes
<b>Transcript available:</b>	3-weeks after the written exam.
<b>Add. info/requirements:</b>	All help is available

## Registration

To register for this course, follow the registration requirements of your **home university** as specified here: [www.euroteq.eu/courses-registration](http://www.euroteq.eu/courses-registration).

## Administration

<b>Number of places:</b>	no cap
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**Minimum participants:**

**Internal course code:** 22202

**Contact:** dufva@dtu.dk

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*This course is part of the EuroTeQ Engineering University joint course catalogue 2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit [www.euroteq.eu](http://www.euroteq.eu) or get in touch with the above-mentioned point of contact.*