



## DEPARTMENT OF MEDICINE, SOLNA

### **K2F6094, Artificial Intelligence in Medical Sciences, 1.5 credits (hec)**

Artificiell intelligens inom medicinsk vetenskap, 1,5 högskolepoäng

*Third-cycle level / Forskarnivå*

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#### **Approval**

This syllabus was approved by The Committee for Doctoral Education on 2025-09-12, and is valid from spring semester 2026.

#### ***Responsible department***

Department of Medicine, Solna, Faculty of Medicine

#### **Prerequisite courses, or equivalent**

No prerequisite courses, or equivalent, demanded for this course.

#### **Purpose & Intended learning outcomes**

##### **Purpose**

The purpose of the course is to provide doctoral students with a basic understanding of the fundamental principles, methodologies, and applications of artificial intelligence (AI) in medical research and clinical practice, as well as critical evaluations of opportunities, limitations, and ethical considerations.

##### **Intended learning outcomes**

At the end of the course, the students are expected to be able to:

- Explain core AI concepts, including machine learning, deep learning, and natural language processing.
- Critically evaluate the use of AI in diagnostics, prognostics, imaging, drug discovery, and precision medicine.
- Apply basic AI methods to medical datasets using Python-based tools.
- Recognize challenges in data quality, bias, reproducibility, and regulation in medical AI.
- Discuss ethical, legal, and regulatory challenges of AI in healthcare.

## Course content

The doctoral course covers a wide range of topics of AI science in medicine:

- i) foundations of AI in medicine,
- ii) machine learning for medical diagnosis,
- iii) AI in drug discovery and genomics,
- iv) AI for personalized medicine and digital health,
- v) ethical, legal, and regulatory challenges, and
- vi) future directions of medical AI.

## Forms of teaching and learning

- Lectures by experts in AI research and clinical AI applications
- Group discussions of assigned topics
- Critical paper reviews
- Group work with short presentations

### *Language of instruction*

The course is given in English

## Grading scale

Pass (G) /Fail (U)

## Compulsory components & forms of assessment

### Compulsory components

Course participants should attend all the course lectures and actively engage in group work and presentation. The participants who have missed course lectures will be assigned extra-reading and home work to compensate the absence.

### Forms of assessment

Individual course participants will be assessed on the basis of the achievement of the intended learning outcomes of the course, including the accomplishment of the assigned course work and the engagement in/contribution to group work and presentation.

## Course literature

Mandatory course literature include lecture handouts and selective teaching materials provided during the course.

Recommended course literature are:

Topol EJ. Learning the language of life with AI. *Science* 2025;387:eadv4414

Rajpurkar P, et al. AI in health and medicine. *Nat Med* 2022;28:31-38.

Ning Y, et al. An ethics assessment tool for artificial intelligence implementation in healthcare: CARE-AI. *Nat Med* 2024;30:3038-3039.

Esteva A. et al. "A guide to deep learning in healthcare." *Nature Medicine* 2019;25:24-29.