

UNIVERSITY OF OSLO

The Faculty of Mathematics and Natural Sciences

Home exam in IN5090, spring 2024

The exam consists of two assignments, which are weighted equally. Respond to the assignments separately and in the order we give them. The maximum length of the combined response is 4000 words (excluding the reference list). Do not write your name on the exam, but use your candidate number.

We expect you to use the material from the course actively in all assignments. You can use the syllabus (articles), slides, group reflection notes, and your own lecture notes. You must explicitly cite from the material when you use them (like this (Jones 2019)). If you include sentences or paragraphs from the course material (i.e., anything not written by you), make sure to indicate so by using quotation marks (like “this”), and indicate where you got the quote from (like this (Jones, 2019, p. 43)). When asked to discuss, we expect you to use any relevant knowledge from the course material (e.g., concepts, arguments, phenomena, examples) to shed light on the question/phenomenon you are discussing, and where relevant include different and/or opposing perspectives.

You are expected to familiarize yourself with the rules that apply to exam support materials and the use of sources (see <https://www.uio.no/english/studies/examinations/cheating/>). You cannot use Generative AI (e.g., ChatGPT, UiOGPT) to generate the text of your answers. However, you can use it for tasks like generating synonyms, checking grammar, and brainstorming ideas. Any misuse of AI tools will be considered a violation of academic integrity

Submit your answer using [Inspira](#), in one PDF document. The deadline for submission is **May 29th at 23:59** (midnight).

Assignment 1 (50%):

Wearables such as smart watches can collect health data about the individual person who uses them. This category of data is often called Patient-Generated Health Data (PGHD). PGHD can possibly provide health-relevant information, but is currently little used by the healthcare sector. For example, patients can record and share data related to their daily activities, dietary habits, and physical exercise. Using this new data source could allow the healthcare service to get more information on patients' health status outside the clinical environment. This can be used for different purposes, for instance, to prioritize the follow-up better (offer follow-up to those who need it most) or to assist the patients towards more health-promoting behaviour, e.g., increase their physical activity.

Imagine a situation where a hospital plans to start using PGHD in diabetes care in a hospital outpatient clinic (norwegian: poliklinikk). The patients' daily glucose measurements (“blood sugar”) is made available to the clinic, who will use these to prioritise and plan their follow-up. This may imply that some patients get more frequent follow-up and others may

get less frequent follow-up. This case therefore implies changes in the work and organization based on using a new type of data.

Discuss the following questions by drawing on the curriculum texts, the lectures, and the shared reflection notes in your response:

1. Discuss how the inclusion of PGHD may affect the data-related work of health personnel and patients
2. One of the general challenges related to health data sharing relates to interoperability. Discuss this in relation to the example.
3. PGHD represents a shift to a data-driven model of organizing healthcare. This may imply changes to how health services are organized. Which possibilities and challenges can this involve?

Assignment 2 (50%):

The Norwegian hospital Akershus University Hospital (Ahus) has developed an Artificial Intelligence (AI) tool for detecting the risk of heart failure in patients. The goal is to provide decision support in clinical work by producing risk predictions for heart failure in an incoming patient based on ECG measurements. An ECG (electrocardiogram) is a test that measures the electrical activity of the heart over a period of time.

Developing AI requires training data, and the AI tool in this case has trained on approximately 100.000 ECG “scans from patients who have been admitted to Ahus in recent years” (*A good heart for ethical AI*, p. 4). The project, therefore, represents a new usage of existing data in health information systems.

The assignment is based on the following texts (one project report and two scientific papers) that provide information about the concrete ECG AI Project:

- [A good heart for ethical AI](https://www.datatilsynet.no/link/9188b3fa9de942bb81b62bec5f68b071.aspx/download) (link to English version: <https://www.datatilsynet.no/link/9188b3fa9de942bb81b62bec5f68b071.aspx/download>) (and to Norwegian version: <https://www.datatilsynet.no/link/6adff313cc744f9181fb9306652911af.aspx/download>)
- [Enabling Clinical Trials of Artificial Intelligence: Infrastructure for Heart Failure Predictions](https://ebooks.iospress.nl/pdf/doi/10.3233/SHTI230098) (<https://ebooks.iospress.nl/pdf/doi/10.3233/SHTI230098>)
- [Data Quality in Healthcare for the Purpose of Artificial Intelligence: A Case Study on ECG Digitalization](https://ebooks.iospress.nl/pdf/doi/10.3233/SHTI230534) (<https://ebooks.iospress.nl/pdf/doi/10.3233/SHTI230534>)

In the course, we have gone through various types of challenges related to making health data available for the decision-making processes. Draw on curriculum texts, the lectures, and the shared reflection notes to discuss the following two questions:

1. Based on the three provided texts about the ECG AI Project, identify and discuss the data-related challenges that have been encountered during the development of the tool.
2. Imagine that you are a health data specialist involved in a project that is going to implement the described AI tool in a different hospital than Ahus. Which ethical issues would you advise hospital management to be aware of?