UMEÅ UNIVERSITY

THE DEVELOPMENT OF A BLUEPRINT FOR EDUCATION ON AI FOR MEDICAL AND HEALTH PROFESSIONALS

A Report of a WASP-ED Project

Helena Lindgren, Department of Computing Science, Umeå University
Madeleine Blusi, Department of Nursing, Umeå University
Caroline Fischl, Occupational Therapy, Jönköping University
Ingeborg Nilsson, Department of Community Medicine and Rehabilitation, Occupational Therapy Unit, Umeå University
Beatrice Pettersson, Department of Community Medicine and Rehabilitation, Physiotherapy Unit, Umeå University

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Department of Computing Science, Department of Nursing, Department of Community Medicine and Rehabilitation, Umeå University

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Introduction

Studies show how AI affects health, mental and social life both positively and negatively on an individual level, through person-tailored interventions, behaviour change systems, clinical decision-support systems, recommender systems, AI companions, AI-infused social media, and other transformative technologies. The economic incentives are strong, the potentials for innovation are massive, while the consequences are still largely unknown. The organization and functioning of healthcare systems changes with AI, and they will need to operate differently both on a local and on a global scale to prevent and mitigate future outbreaks of diseases. In the evolving society increasingly embedding AI and other transformative technologies, the professionals operating within the changing organisations need to also develop their expertise and practices. Academia, which should provide up-to-date evidence-based education and training to meet the urgent and increasing need for medical- and para-medical disciplines, needs to develop its education programs to attract students to meet the needs of society.

We have seen over the past 15 years a profound interest, among the medical and health professionals in Sweden and among international students in the medical and health disciplines, to elevate their knowledge and skills in designing and developing adaptive technology for their clients and their practices. Efforts are currently seen in the field of medical informatics to explore requirements for future education, e.g., [1-2+3 Pettersson, Rydmark, Thurin], and in Sweden there is education on master's level in the field of medical and health informatics, most notably the master program on health informatics provided by Karolinska Institute[1]. However, education is currently lacking that fits their competence and leverages their disciplinary expertise with specific focus on AI-based interventions and decision support. As an example, a workshop is being planned by ENOTHE[2] on the topic AI in Occupational Therapy (OT) education, to be a part of the European OT conference in October 2024[3].

The health care sector employs a variety of licensed health care professionals. In Sweden the National Board of Health and Welfare issue licences to 22 different healthcare professions: nurse, doctor, occupational therapist, physiotherapist, pharmacist, audiologist, midwife, dietitian, chiropractor, healthcare- and medical- social worker/counselor, speech therapist, naprapathy, optician, orthopedic engineer, psychologist, pharmacy technician, biomedical scientist, radiology nurse, medical physicist, dental hygienist and dentist. All these health care professions are, or will be, affected by the ongoing AI-transformation in society. The largest groups of licensed health care professionals are Nurses, Doctors, Physiotherapists and Occupational therapists (Table 1) [4].

Table 1. Statistics of the largest groups of licensed health professionals employed in Sweden.

Licensed profession	**Nr of persons**
Nurses	131 403
Doctors	45 904
Physiotherapists	17 526
Occupational therapists	12 551
Total	**207 384**

[1] https://utbildning.ki.se/programme-syllabus/5HI17
[2] https://enothe.eu/
[3] https://ot-europe2024.com/

The aim for the research presented in this report is to develop a blueprint of an education on human-centred artificial intelligence, which can be combined with existing disciplinary education on master's level. We focus in this work on the disciplinary educations for occupational therapists, physiotherapists and nurses. In total, they represent a workforce of over 160.000 professionals in Sweden. They come equipped with domain expertise on research methodology, instruments, methodology and skills in assessing and intervening in areas of human activity, physical, cognitive, social capabilities to improve health and wellbeing.

The blueprint may be used for developing the courses to be given in autumn 2025 and be used for discussing the development of future education in international disciplinary and multidisciplinary venues. The tangible outcomes of this project is the blueprint (Appendix A), this report, and articles to communicate the results to the disciplinary groups targeted in this work.

The development of the blueprint was funded and conducted as a part of the WASP-ED program funded by Wallenberg Foundations, a joint effort between The Wallenberg AI, Autonomous Systems and Software Program (WASP) and The Wallenberg AI, Autonomous Systems and Software Program - Humanity and Society (WASP-HS).

Methodology

The initial version of the blueprint was developed in workshops among the experts in the project team, based on the outcomes of the National effort on AI education *AI Competence for Sweden* [5], experiences from developing and running existing courses with multidisciplinary laboratory modules across educational programs, and the preliminary WASP-ED AI curriculum as template [6]. The diverse professional and disciplinary backgrounds of the project team contributed to highlighting interprofessional expertise and the ability to collaborate and integrate knowledge and methods from different disciplines as a key competence [7].

The initial version was evaluated locally by study directors, heads of departments responsible for education, and other in position to develop master's level education in the universities for the disciplines in focus for our study. Further, the blueprint was used as a template to integrate tentatively, the courses as electives in existing Master's level educations at the two universities.

The blueprint was also evaluated by comparing this to the WASP-ED curriculum, and to existing master's programmes in Sweden, in particular, the programme on Human-Centred AI hosted by Gothenburg University.

Blueprint Overview

The courses defined in this blueprint aim to train professionals with expertise in their discipline to become a domain expert with basic knowledge in AI with cross-disciplinary understanding of the issues that arise at the intersection of technology, society and the individual.

People will increasingly collaborate with and be supported by interactive, adaptive and social software (systems), often referred to as agents to improve capability and health. These are embedded in intelligent environments and everyday "things" placed in environments, such as chairs, wristbands, phones and what we perceive as "robots", but also in digital infrastructures

in workplaces within, for example, healthcare. Shaping meaningful interaction with such digital companions in interventions for better health, or as collaborative partners in clinical work will be addressed from complementary perspectives: human-centered artificial intelligence (HCAI), human participation and influence, socio-technical systems, responsible design and values.

The following three courses on advanced level aim to cover these perspectives (we use acronyms in brackets in subsequent parts of this report):

Course 1: Human-Centered AI for Health and Wellbeing (AI 1)

Course 2: Responsible Design of Interactive AI Systems for Health and Wellbeing (AI 2)

Course 3: Human-AI Interaction for Health and Wellbeing (AI 3)

In addition, we define a thesis course to complement the first three courses, intended to be mandatory for an examination that is a specialization in a disciplinary topic with a profile in Human-Centered AI for Health and Wellbeing.

We have identified three levels of integration of education in artificial intelligence in the field of health and medicine, which are as:

1. single course(s),
2. course packages optional in existing subject-specific master's programs,
3. course package that builds a master's program with examination in "subject X with a focus on AI for Health and Wellbeing" or similar.

In Appendix A the courses and three levels are described in more detail. First, we evaluate the blueprint by mapping this to the WASP-ED Curriculum in the following section. Next, in subsequent sections, we exemplify the levels when mapping the blueprint to existing education at Jönköping University and Umeå University and compare the blueprint with existing master's programmes.

Evaluation of the Blueprint - a Mapping to The WASP-ED Curriculum

The first course (AI 1) maps to the core AI functionalities specified in the WASP-ED Curriculum, however, introduced at a level that is accessible to the targeted group of students considering their professional backgrounds. Since we chose to not require programming skills, we approach the AI techniques in a practical, problem-oriented way. Case methodology is aimed to be applied, with examples and hands-on exercises to become familiar with both data-driven and knowledge-driven techniques and approaches to applying AI to improve health and wellbeing.

The second course (AI 2) focuses on responsible design of interactive AI systems for improving health and wellbeing. Ethical, social, personal consequences of interventions and clinical decision-support systems are explored and the methodologies to design, capture and address these. This course covers the layer in the WASP-ED Curriculum addressing AI that impact society and people, and that needs to be constrained by societal regulations and evidence-based consequences of AI.

The third course (AI 3) gives the student deepened knowledge and skills in designing human-AI interaction and collaboration for the purpose to improve health and wellbeing. Behaviour

change systems and decision-support systems are at focus. (see Figure 1 for a schematic overview)

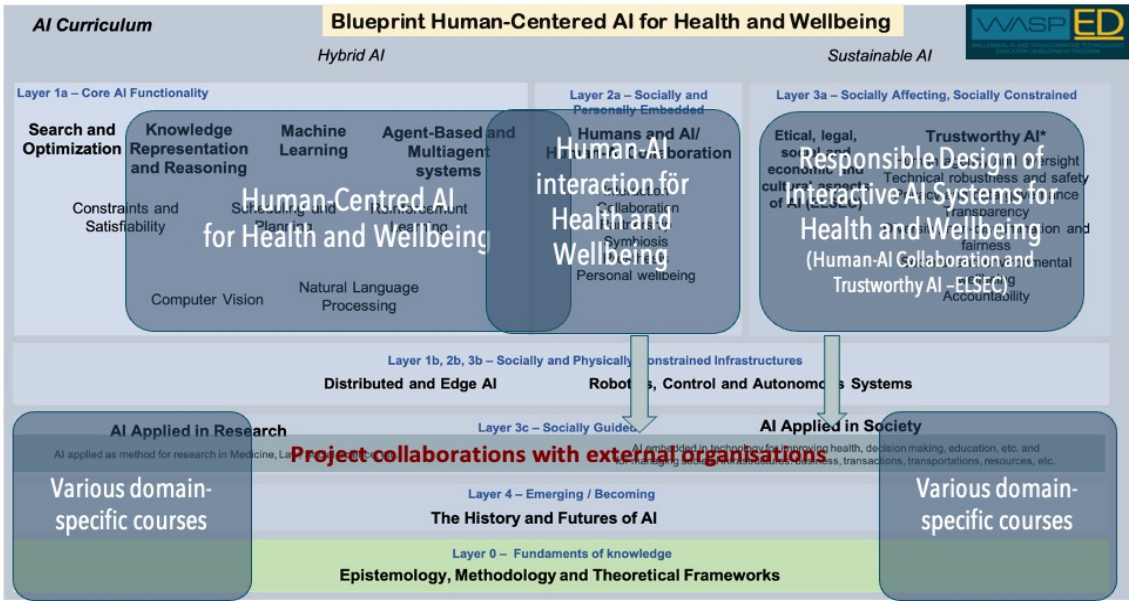

Figure 1: Overview how the three proposed courses would cover the topic areas in the WASP-ED Curriculum.

To summarize, the three proposed courses cover topics across core AI functionality, human-AI interaction aspects, ethical, legal, human and social aspects and organisational perspectives. Theories and methodologies range across disciplines such as human-computer interaction, psychology, social and media studies.

By applying practical challenges in collaboration with medical and health professionals in the public health organisations, the applicability of AI techniques for improving health and wellbeing, clinical practice is challenged, giving new insights to both the students and the clinicians engaging in the students' projects.

Evaluation of the Blueprint - a Mapping to Existing Education at two Swedish Universities

The blueprint was evaluated by applying the proposed courses and course package in existing master-level education, to see how these could embed AI education in the format they are given currently. To be taken into consideration is that the advanced education for the medical and health disciplines in focus for our development, occupational therapy, physiotherapy and nursing, often is attended part time in combination with clinical work. A two-year master program takes consequently, four years to complete.

In the following the blueprint is evaluated and mapped to existing programs at Umeå University and Jönköping University. To summarize, it was concluded that the proposed education could be integrated in existing education at the three levels, where the third level would require that a specialized master examination course is defined.

Jönköping University: Occupational Therapy

The School of Health and Welfare at Jönköping University offers two master programmes for occupational therapy – the 60-credit programme in Swedish and the 120-credit programme for international students. The 60-credit programme consists of 15 credits in scientific method, 37.5 credits in occupational therapy including a 15-credit thesis course, and 7.5 credits in an elected topic. Either course 1 or course 2 in the AI-blueprint can be taken as an elective. With course 1, students would get familiarised with basic concepts in AI and apply them in cases. It is possible to have students registered in the programme with more knowledge of AI (for example, occupational therapists with the responsibility over digital technologies), who may be more interested in applying AI-knowledge in drafting a project proposal.

Course 1 (or 2) fits with the local objective: *redogöra för hur samverkan i team och/eller med olika samhällsaktörer bidrar till professionsutveckling och människors hälsa* (to describe how collaboration in a team and/or community stakeholders contribute to development of the profession and people's health).

Courses 2 and 3 fit in the 120-credit programme, in relation to the temporal organisation of the programme and content (local objectives): plan and create conditions for developing skills and abilities of individuals and groups to handle processes of improvement and development, and plan and create conditions for collaboration between teams in improvements and developments within occupational therapy.

For master's program: mandatory courses should be taken, the three AI courses can be part of the existing program. It is possible to do a thesis (as a partial requirement for a master's degree in occupational therapy) encompassing AI for health as long as it is still within occupational therapy as a main field of study. If a student decides to do a thesis with orientation to AI for health and not occupational therapy, then the student may not receive a degree in occupational therapy. This is in accordance with the Swedish Higher Education Act (1993:100) [8]:

> *Independent project (degree project)*
> *A requirement for the award of a Degree of Master (120 credits) is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study. The degree project may comprise less than 30 credits, however no less than 15 credits, if the student has already completed an independent project in the second cycle for at least 15 credits in the main field of study or the equivalent from a programme of study outside Sweden.*

As elective, free-standing courses: Elective courses are part of the program in occupational therapy, so the proposed AI courses can be at the same level as domain-specific courses, depending on the focus of the assignments. As a free-standing course (taken by students not admitted in the programme), they would not be at the same level of domain expertise as domain-specific courses.

Umeå University: Occupational Therapy

The department managers expressed a positive view on the proposal for three optional courses to be included in the master's program. They find the content of the courses relevant and consider the scope of 7,5 credits each to be appropriate.

They will need to verify whether a student can obtain a "Master's in Occupational Therapy with a focus on AI" degree after completing 22,5 credits. They also believe that offering the courses at a half-speed pace could be more attractive, as many students combine their studies with clinical work.

We discussed the competence of teachers, and the managers are supportive of having both domain experts and AI specialists collaborate to lead the courses. They are optimistic that the courses can function both independently and as part of the master's program, although financial constraints within the faculty may limit the introduction of individual courses.

Regarding the thesis course, it can be incorporated into the existing thesis work course, which has prerequisites in the Scientific Method. The structure of the thesis course is suitable for AI-related occupational therapy projects. Students interested in this focus must complete AI 1, AI 2, AI 3 before taking the Scientific Method and the thesis course.

However, the managers do not find it appropriate for the thesis focused on Occupational Therapy and AI to comprise 15 credits, as this would necessitate the creation of a new course.

Summary: We seem to have planned and thought in the right direction in relation to the occupational therapy program [9-10].

For Master's programme: Courses 1-3 can be integrated in the existing and proposed 120-credit Master's Programme.

As elective, free-standing courses: All three AI courses could be integrated as elective course.

Umeå University: Nursing

Current master programmes
The department of Nursing at Umeå University offers two types of master programmes: 120-credit master programmes and 60-credit programmes [11-13].

The 120-credit programme consists of 45 credits mandatory courses and 75 credits elective courses. The mandatory courses consist of 15 credits scientific methods and a 30-credit master thesis course. Of the 75 credits elective courses a minimum of 30 credits must consist of advanced courses within the main field of study (nursing) while the remaining 45 credits can be used on elective courses within the main field of study or other relevant, related subjects (Table 2). This leaves room for students to take one, two or all of the proposed AI-courses AI1-AI3 within the master program in nursing.

As many students on the 120 credit master program in nursing need to combine their advanced studies with clinical work the master program runs as 50% studies during 4 years, thus spanning 8 semesters. Possible distribution of courses during semesters 1-8 of the program is shown in Table 3. In Table 3 the proposed AI courses 1-3 has been put into the syllabus, to illustrate how the AI-courses can be distributed during the current syllabus of the master program. Note that scheduling of the AI-courses in Table 3 is an example. With regards to the generous flexibility as well as generous content of elective courses in the 120-credit master programme it would be possible to schedule the AI-courses at other semesters or periods during the four years of study.

This generous flexibility may be a key factor to enabling co-provision of the AI-courses in collaboration with other master programs, as suggested in the blueprint.

The department of nursing also provides eleven different 60-credit master programs. Besides a master programme in the main subject Nursing, additional 60-credit programmes are provided in the following ten nursing specialist subjects: 1) pediatrics, 2) psychiatry, 3) anesthesia, 4) surgery/operating theatre, 5) primary care, 6) cardiology, 7) oncology, 8) intensive care, 9) pre-hospital critical care/emergency medical services/ambulance care, and 10) care of elderly/geriatric nursing.

Distribution of courses, as well as the proportion of elective courses, is different in each 6o-credit master program, ranging from some specialist programs having zero elective courses to the master programme in nursing allowing 15 credits of elective courses. Based on this it is currently not considered feasible to generally introduce the proposed AI courses in the specialist 60-hp programmes, however there is limited room for elective courses in some of the 60-credit programmes, where Course 1 could be offered as elective courses. In the 60-credit programme in nursing it may be possible to offer both Course 1 and Course 2 as elective.

Evaluation

The proposed blueprint has been presented to a group of stakeholders at the department of nursing. The blueprint was presented orally and in writing. The group reviewed and discussed: a) The current master programme along with its syllabus and course content, b) formal rules, procedures and routines for starting new courses/programs or changing current courses/programmes, d) formal structures and mandate for decisions regarding cross-faculty courses and elective courses.

For master's program: Courses AI1-3 can be integrated in the existing 120-credit programme.

As elective, free-standing courses: Course 1 may be taken as elective course in some of the 60-credit master programmes. There is no apparent difference in level of domain expertise between students in 120- or 60- credit programmes.

Umeå University: Physiotherapy

The department of Physiotherapy at Umeå University offers two types of master's programmes, a 120-credit master's programme and a 60-credit programme. The 120-credit Master's Programme in Physioterapy consists of 45 credits of mandatory courses and 75 credits of elective courses. The mandatory courses include 15 credits in scientific theories and methods, along with a 30-credit master's thesis. Of the remaining 75 credits, at least 45 credits need to be advanced-level courses, and at least 30 credits applied to courses within physiotherapy.

Similarly, the 60-credit programme requires students to complete 60 credits, of which at least 45 credits must be at the advanced level. Among these, at least 30 credits must be within the main field of study, including a 15-credit thesis. This structure allows students to select one, two, or all three proposed AI courses (Course 1-3) as part of their elective options.
Many students in the 120-credit Master's Programme in Physiotherapy combine their studies with clinical work. To accommodate this, the programme is structured as 50% part-time study over four years, spanning eight semesters.

In the current programme, there is considerable flexibility in choosing elective courses during six of the eight semesters. However, as the programme is currently under revision, it is likely that all courses in the 60-credit Master's Programme will become mandatory. Consequently, this change will also make the first 60 credits of the 120-credit Master's Programme obligatory. Due to this shift, it is not considered feasible to introduce the proposed AI courses into the 60-credit programme. Nevertheless, all three AI courses can still be offered as electives within the 120-credit Master's Programme (Figure 4).

Given the significant flexibility in the elective courses of the programme, it would be possible to schedule the AI courses during different semesters over the last two years of study, which could facilitate co-provision of the AI courses with other Master's programmes.

For Master's programme: Courses 1-3 can be integrated in the existing and proposed 120-credit Master's Programme.

As elective, free-standing courses: All three AI courses could be taken as elective course in the last four semesters of the 120-credit Master's Programme.

Umeå University: MAI – The Medical Faculty's Council for AI

The departments and master programmes at Umeå University that are mentioned in this report are part of the Faculty of Medicine at Umeå University. The Faculty of Medicine is engaged in education and research in the fields of medicine, odontology and health care. The Faculty comprises of 13 departments, 7 research centres, and has about 3,400 active students and about 450 at the postgraduate level. The Faculty has approximately 1100 employees, of which 45 percent are teachers/researchers.

The Faculty of Medicine has it's own Council for Artificial Intelligence and Autonomous Systems, MAI. MAI is an advisory body for the faculty management and the dean.

The goals of MAI is to:

- Strengthen research and education in application of AI in medicine, biomedicine and life science
- Promote cross-faculty collaborations within applied AI
- Strengthen national and international collaborations and network

Members of the council represent the different departments at the faculty of medicine. The council also has one student representative and one representative from the largest healthcare provider in the area, Region Västerbotten.

Throughout the years, MAI has carried out strategic activities aiming to support and stimulate AI education tailored to the needs of teachers and students at the faculty of medicine. Both Umeå University and other universities throughout Sweden, Europe and the rest of the world offer a wide variety of education in AI. Several persons from the faculty of medicine have attended such educations and reported to MAI that many of those educations have technology focus and the clinical situation of the health care professional becomes a context in which the technology can be applied. MAI has experienced that there is a need for education with a reversed approach → AI education grounded in the health care context, where health care needs come first and drive the technology.

An AI-education on human-centred artificial intelligence, which can be combined with existing disciplinary education on master's level, targeting students in health care professions, is in line with MAI's purpose and goals.

For master's program and as elective, free-standing courses : The proposed blueprint is in line with the goals presented by the council for artificial intelligence and autonomous systems for the medical faculty (MAI), at Umeå University. For students from various health professions to be able to study the proposed courses in master's programs or as elective, free-standing courses, is a desired outcome of MAI's long-term strategy for AI education at the medical faculty.

Examples of how courses can be embedded in existing programs as electives

In the following subsections the program overviews of existing master's programmes at Jönköping and Umeå Universities are shown with slots for where the three AI courses could be elected as complements to the domain-specific courses that are part of each programme.

Jönköping University: Occupational Therapy

Overview - Magister i arbetsterapi, 60 hp, Jönköping University

Year 1

Termin 1		Termin 2	
Period 1	Period 2	Period 3	Period 4
Vetenskapsteori och vetenskaplig metod, 15 hp		Arbetsterapi, teori I, 7,5 hp	Teamsamverkan i en föränderlig organisation[1], 7,5 hp
			Occupational Therapy, Community-Based Practice[1]. 7,5 hp
			AI - KURS 1 7,5 hp (ELECTIVE)

Year 2

Termin 3		Termin 4	
Period 1	Period 2	Period 3	Period 4
Aktivitetens betydelse för hälsa I, 7,5 hp	Evidensbasering inom hälsa och välfärd, 7,5 hp	Arbetsterapi, examensarbete I, 15 hp	

Master's Programme overview following a 50% study pace

Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Theory of Science and Scientific Method, 15 credits		Occupational Therapy, Theory I, 7.5 credits	Occupational Therapy, Community-based Practice, 7.5 credits (ELECTIVE)
			AI COURSE I, 7.5 credits (ELECTIVE)

Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
An Occupational Perspective of Health I, 7.5 credits	Occupational Therapy, Evidence-based Practice I, 7.5 credits	Occupational Therapy, Thesis I, 15 credits	

Year 3

Semester 5		Semester 6	
Period 1	Period 2	Period 3	Period 4
An Occupational Perspective of Health II, 7.5 credits		Occupational Therapy, Theory and Evidence-based Practice II, 15 credits	
Co-production in Health and Welfare, 7.5 credits (ELECTIVE)			
AI COURSE 2 (ELECTIVE)			

Year 4

Semester 7		Semester 8	
Period 1	Period 2	Period 3	Period 4
Research Design, Strategies, and Ethics, 7.5 credits	Team Collaboration in Changing Organisations, 7.5 credits (ELECTIVE)	Occupational Therapy, Thesis II, 15 credits	
	AI COURSE 3 (ELECTIVE)		

Umeå University: Occupational Therapy

Overview – Master's Programme overview, 60 hp, Umeå universitet (50% study pace)

Year 1

Semester 1	Semester 2
Vetenskaplig teori och metod, 15 hp	All courses elective:
	Klinisk tillämpning av arbetsterapeutiska teorier och modeller, 15 hp
	Evidensbaserad arbetsterapi, 7,5 hp
	Belastningsergonomi: arbetsplatsanalys och riskbedömning, 7,5 hp
	Bildskapande i utredning, terapi, rehabilitering och handledning, 15 hp
	AI COURSE 1

Year 2

Semester 3	Semester 4
Examensarbete i arbetsterapi 30 hp	Forts.Examensarbete i arbetsterapi 30 hp

Year 3

Semester 5	Semester 6
All courses elective:	All courses elective:
Fördjupning inom vetenskaplig metodik, 15 hp	Evidensbaserad arbetsterapi, 7,5 hp
Yrkesmässig handledning, 7,5 hp	Belastningsergonomi: arbetsplatsanalys och riskbedömning, 7,5 hp
Arbetsterapi: arbetsförmåga och rehabilitering till arbetslivet, 7,5 hp	Bildskapande i utredning, terapi, rehabilitering och handledning, 15 hp
AI COURSE 2	Klinisk tillämpning av arbetsterapeutiska teorier och modeller, 15 hp
	Alternative: AI COURSE 2

Year 4

Semester 7	Semester 8
All courses elective:	All courses elective:
Yrkesmässig handledning, 7,5 hp	Evidensbaserad arbetsterapi, 7,5 hp
Arbetsterapi: arbetsförmåga och rehabilitering till arbetslivet, 7,5 hp	Belastningsergonomi: arbetsplatsanalys och riskbedömning, 7,5 hp
Fördjupning inom vetenskaplig metodik, 15 hp	Bildskapande i utredning, terapi, rehabilitering och handledning, 15 hp
AI COURSE 3	Alternative: AI COURSE 3

Umeå University: Nursing

The following is an overview of the Master's Programme in Nursing at Umeå University, 120 ECTs, 50% study pace, summarised in Table 2.

Table 2. Overview, distribution of mandatory and elective courses in the 120 master programme at department of nursing.

Type of course	Content	Credits
Mandatory	Research methods 1	7,5
	Research methods 2	7,5
	Master thesis	30
	Total credits Mandatory	45
Elective	Subject specialization within the main topic	30 (min)
	Subject specialization within the main topic *or* courses related to, and/or relevant for the main topic	45
	Total credits Elective	75
	Total credits Master Program	120

The mandatory course qualitative research methods runs every autumn semester and can be taken as elective course periods 2 during any of the semesters 1, 3 or 5. AI-courses can be taken at any of the semesters, except semester 7 and 8 (Table 3).

Table 3. Distribution of mandatory and elective courses, including potential AI courses over Year 1-4 (50% study pace).

Year 1

Semester 1	Semester 2
Period 1. Quantitative research methods 7,5 credits (mandatory)	All courses elective:
Period 2. Subject specialization 7,5 credits (ELECTIVE) or Qualitative research methods 7,5 hp or AI Course 1 (elective)	Subject specialization 7,5 credits and AI-course 1 7,5 credits
	Subject specialization 7,5 credits and Subject specialization 7,5 credits

Year 2

Semester 3	Semester 4
Period 1. Subject specialization 7,5 credits or AI Course 1	All courses elective:
Period 2. Subject specialization 7,5 credits or Qualitative reserach methods 7,5 credits or AI Course 7,5 credits	Subject specialization 7,5 credits and AI-course 7,5 credits
	Subject specialization 7,5 credits and Subject specialization 7,5 credits

Year 3

Semester 5	Semester 6
Period 1. Subject specialization 7,5 credits or AI Course 1	All courses elective:
Period 2. Subject specialization 7,5 credits or Qualitative reserach methods 7,5 credits or AI Course 7,5 credits	Subject specialization 7,5 credits and AI-course 7,5 credits

	Subject specialization 7,5 credits and Subject specialization 7,5 credits

Year 4

Semester 7	Semester 8
Master thesis 30 credits (runs over 2 semesters)	

Umeå University: Physiotherapy

The following table provides an outline of the planned Master's Programme in Physiotherapy, which is being developed. The proposed AI Courses (in parentheses) could be distributed between semester 5-8 in the planned syllabus.

Table 4. Outline of the planned Master's Programme in Physiotherapy.

120 credit Master's Programme in Physiotherapy	
Semester 1	Physiotherapy – Scientific Theory and Methods, 15 credits (MANDATORY)
Semester 2	Physiotherapy – Clinical Evaluation and Measurements, 7,5 credits (MANDATORY) Physiotherapy – Evidence Based Practice, 7,5 credits (MANDATORY)
Semester 3 & 4	Master's Thesis in Physiotherapy, 30 credits (MANDATORY)
Semester 5	Elective courses, 15 credits
Semester 6	Elective courses, 15 credits (AI course I, 7,5 credits)
Semester 7	Elective courses, 15 credits (AI course II, 7,5 credits)
Semester 8	Elective courses, 15 credits (AI course III, 7,5 credits)

Evaluation of the Blueprint - a Mapping to Existing Master's Programmes on AI in Sweden

The need for engineering and computational expertise to develop and manage the current and future data-driven AI systems is huge, which is repeated in many reports [14-17]. To address the need there is a number of Master's programmes in Sweden that provides education on machine learning (ML), data science and similar topics. Further, initiatives also develop short courses to further increase the knowledge and skills among professionals [5]. Education targeting the medical professionals, primary physicians, is provided as extensions to research methodology courses with emphasis on statistical, and more recently, ML-based techniques, to utilise medical data for research and for the development of clinical practices.

There are few initiatives in higher education where the aim is to develop Master's level education on human-centred AI (HCAI), defined by Novak and colleagues as AI that collaborates and supports people in achieving their goals [18]. Education on human-robot interaction brings some of this into the education along with the traditional robotics topics. Traditional human-computer interaction programmes are developed to integrate more focus on interacting with AI systems, and the classical programme on AI at Umeå University targeting engineers integrates the human-centred perspective in one of the elective tracks with one course that is mandatory.

Gothenburg University gives the Master's program on Human-Centred Artificial Intelligence (HCAI) which leads to an Master's degree in applied information technology with a specialisation in HCAI. This master's programme requires three courses: programming, HCI and AI, to be admitted. If health professionals interested in education on health-related technologies do not have these prerequisites, the master's programme in health informatics given jointly by Karolinska Institute and Stockholm University allows professionals with a background in OT, PT or nursing to be admitted. By completing either of these two programmes, the student complements their basic education with a second degree that could allow them to extend their practices towards taking part in developing new AI systems for healthcare.

However, these programmes give the student generic knowledge in established professional domains other than their own discipline, not directly applicable as a deepened expertise in their own area. For instance, the HCAI master's programme given by Gothenburg is composed by the following four main 15 ECTs courses: Introduction to Human-centered AI, Interaction Design and AI, Fairness, Accountability and Transparency in Artificial Intelligence, and AI and Human Thinking. The content of these are mainly in the intersection of HCI and AI including trustworthy AI. There is an overlap in content when comparing GU:s programme with the proposed courses in this blueprint. The topics brought up at the HCAI master's programme would in the proposed courses be discussed and applied in the context of health and wellbeing. However, comparing the blueprint with the master's programme on health Informatics, there would be less focus on IT systems and infrastructures for healthcare, and more on HCAI and prevention, which to a large extent takes place in every-day life and outside of healthcare organisations.

Competence Profile for Teachers and Teacher Team

Across the courses, we expect that a teacher's team would include competences in both AI and in the medical/health domains.

For the first course, familiarity with the AI techniques and the software tools to be introduced is required. For the second course, familiarity with responsible design and design methodology applied to interactive AI systems is required. For the third course, familiarity with AI-based interaction technologies, such as dialogue systems, avatars, mixed reality is beneficial.

Discussion

The course package aims to train professionals with expertise in a healthcare discipline to become domain experts with basic AI knowledge and interdisciplinary understanding of the issues arising at the intersection of technology, society, and individuals. This is in line with the report published spring 2024 by the Swedish Higher Education (In Swedish, Universitetskanslerämbetet, UKÄ) [14]. The report highlights that healthcare is facing significant future challenges that AI could help address. It emphasizes the need to integrate AI knowledge into educational programs. The most straightforward approach is to develop modules within existing programs with learning objectives specifically targeting AI. This blueprint provides suggestions of how this can be done for healthcare disciplines.

The UKÄ report [14] highlights several key points regarding the integration of AI into education. It emphasizes the importance of domain experts learning fundamental AI concepts and developing an interdisciplinary understanding of issues that arise at the intersection of technology, society, and individuals, with a particular focus on ethics and law. The report advocates for embedding AI components into existing long-term educational programs to effectively train a large number of domain experts. Additionally, it underscores the need for these professionals to be able to evaluate the correctness and relevance of AI system outputs, understand proper and improper use of data and algorithms, address issues of discrimination, and grasp the connection between training data and results. Achieving AI literacy and acquiring sufficient technical knowledge to bridge the gap between technology and its practical applications are also highlighted as crucial. These are all educational aims captured in the proposed set of courses.

The report also notes that a key requirement for research-based AI education is collaboration within educational institutions. This collaboration is closely linked to the interdisciplinary perspective needed in AI-focused education. Institutions or departments may need to establish partnerships and possibly adjust eligibility requirements to provide students with more interdisciplinary education. These aspects have been discussed during the project, in particular, potential requirements in programming to be admitted to courses. The courses have been formed, assuming that the healthcare professionals do not have courses in programming before attending the first course. This is to be further tested and evaluated.

To provide licensed healthcare professionals with the opportunity to earn a Master's degree in their basic topic with a specialisation towards e.g., AI for health and wellbeing would require Socialstyrelsen to approve. Socialstyrelsen issues specialist-licenses to licensed healthcare professionals. Proof of the right to call oneself a specialist nurse/doctor may only be issued for specializations referred to in the Higher Education Ordinance (1993:100) [8].

An alternative to the govermnent-regulated specialist degree for licensed healthcare professionals could be the university introducing a degree subject called 'Specialization in Human-Centered AI for Health.' At Umeå University, for developing such a degree from

courses given in multi-deparment collaboration to professionals from more than one professional domain, it takes approximately 1,5 years until they are approved.

To summarise, the implementation of courses 1, 2, and 3 is possible at least as electives in existing programmes, but can be delayed by academic structures, economy, and procedures. The process for approval of a course syllabus at a Swedish university takes a minimum one year before the planned course offering. As a mandatory or an elective course in programmes, revision of programme syllabi can also take about one to one and a half years. While there are administrative challenges, the alternative, to aim to earn two separate degrees by taking the long way through a second standard programmes including attending the courses required to be admitted (e.g., to the HCAI programme at Gothenburg University), is not expected to be desirable by most of the professionals. Therefore, we, and the education representatives that have provided their perspectives on the proposed courses and the blueprint, find the possibility to form dedicated courses tailored to the health professionals highly interesting and desirable to pursue in the near future.

Conclusions and Future Work

A blueprint has been created and evaluated at two universities. The blueprint targets the disciplinary education for nurses, occupational therapists and physiotherapists at Master's level.

Across the existing programmes, it is possible to integrate the three proposed AI courses among elective courses in the studied programmes.

To formalise a Master's programme with specialisation towards AI and health, basing this on the three disciplines studied in this project, requires to adhere to the regulations that govern specialised education that leads to authorization to practice. This would be a continued task to explore in a continuation of this work.

To disseminate our results and to continue a deepened discussion within the disciplines, we aim to host a workshop at the European Occupational Therapy conference in October, and publish articles in disciplinary venues such as the unions' member channels, conferences and workshops (ENOTHE 2025, Arbetsterapiforum 2025, the NU conference 2026).

Other research and higher education venues are the medical informatics forum, a draft is taking form for the MIE conference 2025, deadline September. We also aim to present results at seminar series organised by SKR, UKÄ, SFMI and Vitalis 2025.

A first step towards implementation is to develop the AI Course 1 and run this at a university. This has to be further discussed among the universities engaged in this project and beyond.

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APPENDIX A: BLUEPRINT – Utbildning i AI och hälsa för vårdvetenskaperna

Madeleine Blusi, Helena Lindgren, Ingeborg Nilsson, Umeå Universitet
Caroline Fischl, Jönköpings university

En blueprint för utbildning i artificiell intelligens (AI) för professionella med grundutbildning i områdena arbetsterapi, fysioterapi och omvårdnad utvecklas inom ramen för WASP-ED[4] under 2024. I detta dokument presenteras den första versionen av denna, avsedd att ligga till grund för utvärdering och vidareutveckling av utbildning vid svenska lärosäten.

Vi har identifierat tre nivåer av integration av utbildning i artificiell intelligens inom området hälsa och medicin:

- enstaka kurs(er),
- kurspaket valbara i existerande ämnesspecifika masterprogram,
- kurspaket som bygger ett masterprogram med examination i ett specifikt "basämne med inriktning mot AI för hälsa".

Vi har utvärderat detta förslag utifrån existerande utbildning i basämnena arbetsterapi, fysioterapi och omvårdnad. Vi har valt att fokusera på utbildning på avancerad nivå där yrkesutbildade kan fördjupa sig i områden, såsom hälsoteknologi.

I följande är de tre nivåerna närmare beskrivna som grund till de kurser och kurspaket som föreslås.

Förkunskapskrav

Vi har identifierat och utvecklat blueprints för tre kompletterande AI-kurser som bygger på varandra. För att antas till den första kursen krävs följande:

- Kandidatexamen/yrkesexamen i basämne
- För masterprogram vid medicinsk fakultet: Yrkesexamen 180 hp varav minst 15 hp examensarbete: arbetsterapi (AT), omvårdnad (SSK), fysioterapi (FT)
- För läsa Kurs 1 som fristående kurs: 180 HP/kandidatexamen

I nuläget utgår vi ifrån att programmering inte är ett förkunskapskrav. Däremot förutsätter vi att studenterna har med sig kunskaper och färdigheter i vetenskaplig metod, samt metoder och verktyg för att förstå och bedöma människans behov av digitalt stöd i vardagliga aktiviteter och för att förbättra hälsa. Detta innefattar domänkunskap i området människans aktivitet, förmågor, kognition och hälsa.

Översikt och inriktning

Kurserna definierade i denna blueprint avser att utbilda dig med expertis i en disciplin till att kunna vara verksam som domänexpert med grundläggande kunskap i AI med tvärdisciplinär förståelse om de frågor som uppstår i skärningspunkten mellan teknik, samhälle och individen (interprofessionell utbildning - IPE).

[4] https://wasp-ed.org/

Människor kommer i ökad utsträckning att samarbeta med och stödjas av interaktiva, adaptiva och sociala programvaror (system), ofta kallade mjukvaruagenter, för att förbättra förmåga och hälsa. Dessa är inbäddade i intelligenta miljöer och vardagliga ting placerade i fysiska miljöer, såsom stolar, armband, telefoner och vad vi uppfattar som "robotar", men även i digitala infrastrukturer i arbetsplatser inom exempelvis hälso- och sjukvården. Utbildningen kommer att ta upp hur forma meningsfull interaktion med sådana digitala följeslagare i interventioner för bättre hälsa, eller som samarbetsparners i kliniskt arbete. Detta kommer att tas upp ur kompletterande perspektiv: människocentrerad artificiell intelligens (HCAI), människans deltagande och inflytande, sociotekniska system, ansvarsfull design som tar värderingar i beaktande. Etiska aspekter är grundläggande i all utbildning inom hälso-och sjukvård, liksom i de kurser som denna blueprint innefattar. Följande tre kurser som bygger på varandra har definierats för att täcka dessa perspektiv:

Kurs 1: Människo-centrerad AI för hälsa och välmående (AI 1)
Kurs 2: Ansvarsfull design av interaktiva AI-system för hälsa och välmående (AI 2)
Kurs 3: Människa-AI interaktion för hälsa och välmående (AI 3)

Följande kursbeskrivningar är förslag på lärmål och innehåll som kan modifieras utifrån lokala behov och utbildningssammanhang. Lärmålen är flera för varje kurs, flera är överlappande i innehåll, för att man ska kunna göra ett urval som passar fokus i det sammanhang där kurserna ska implementeras. Halvtidsfart är föreslaget för att kunna passa att läsa parallellt med arbete.

Kurs 1: Människo-centrerad AI för hälsa och välmående, 7,5 HP

Förkunskapskrav: Kandidatexamen/yrkesexamen i basämne arbetsterapi, fysioterapi, omvårdnad

Kursen Människo-centrerad AI för hälsa och välmående ger en introduktion till artificiell intelligens (AI) tillämpad inom vården för att förbättra hälsa och välbefinnande. Fokus läggs på kunskapsbaserade system som verktyg för kliniskt beslutsstöd, kompetensutveckling och personanpassade interventioner. Teknikerna för artificiell intelligens introduceras utifrån följande teman:

- *AI-baserade interventioner*; design och utveckling av beteendeförändringssystem och beslutsstödsystem;
- *de professionellas perspektiv*: förändring av arbetsmetoder när nya digitala verktyg introduceras; och
- *medborgarens, eller patientens perspektiv* på digitala hjälpmedel för hälsa, t.ex. etik, jämlikhet, rättvisa, autonomi, självmonitorering.

Lärmål

Kunskap och förståelse

Efter avslutad kurs ska studenten kunna:

- (FSR 1) Ge en översikt över området artificiell intelligens, dess bakgrund, historia, grundläggande frågor, utmaningar och huvudinriktningar,
- (FSR 2) Förstå och förklara begrepp och termer relaterade till människocentrerad artificiell intelligens tillämpad på hälsa och välbefinnande,
- (FSR 3) Förklara fördelarna, skillnaderna och begränsningarna med olika kunskapsbaserade och datadrivna AI-tekniker, och deras kombinationer, tillämpade på

hälsa och välbefinnande (beskriva möjligheter och begränsningar av olika AI-tekniker),
- (FSR 4) Artikulera relevanta krav relaterade till artificiell intelligens-baserade system för hälso- och sjukvård.

Färdighet och förmåga
Efter avslutad kurs ska studenten kunna:
- (FSR 5) visa praktiska färdigheter i att konceptualisera grundläggande intelligenta mjukvarusystem för hälsa och välbefinnande som bygger på de introducerade AI-teknikerna.
- (FSR 6) visa praktiska färdigheter i att identifiera kunskap och översätta domänkunskap till maskinläsbart format,
- (FSR 7) förklara hur de olika AI-teknikerna kan användas i tillämpningar som syftar till att förbättra hälsa och välbefinnande,
- (FSR 8) visa praktiska färdigheter i att bedöma begränsningarna hos metoder för artificiell intelligens som tillämpas för hälsa och välbefinnande,
- (FSR 9) kommunicera sina konceptualiseringar och bedömningar av AI-system i kommunikationen med andra discipliner och klienter (kommunicera och använda begreppen i kommunikation med andra discipliner och brukare),
- (FSR 10) visa tvärvetenskaplig förståelse och kommunicera över disciplingränser (tvärvetenskaplig förståelse, och kommunicera över professionsgränserna (problemlösning i skärningspunkten i professionen för AI ska implementeras)).

Värderingsförmåga och förhållningssätt
Efter avslutad kurs ska studenten kunna:
- (FSR 11) förklara hur mänskliga och samhälleliga värderingar förhåller sig till de introducerade AI-teorier, metoder och principer,
- (FSR 12) analysera och diskutera konsekvenser av artificiell intelligens för individen, samhället och miljön (att kunna reflektera över etiska, legala, sociala, personliga konsekvenser av AI),
- (FSR 13) kritiskt förstå och diskutera etiska och jämställdhetsaspekter relaterade till utvecklingen av AI för hälsa och sjukvård,
- (FSR 14) tillämpa ny kunskap på disciplinära utmaningar relaterade till tillämpningen av AI i sina egna medicinska och hälsorelaterade arbetsmetoder. (konsekvenser för professionella och organisationer),
- (FSR 15) kritiskt förstå och diskutera system för beslutsstöd och hälsobeteendeförändring och deras konsekvenser för disciplinarbete och patienter/klienter,
- (FSR 16) kritiskt förstå och diskutera etiska och jämställdhetsaspekter relaterade till utvecklingen av AI för hälsa och sjukvård.

Pedagogisk metod innefattar interdisciplinärt lärande och case-metodik.

Kurs 2: Design av interaktiva AI-system för hälsa och välmående, 7,5 HP

Förkunskapskrav: AI-kurs 1

Kursen Design av interaktiva AI-system för hälsa och välmående syftar till att fördjupa kunskaper och färdigheter i dels designmetodik för ansvarsfull utveckling av interaktiva AI-baserade system och miljöer med fokus på människo-centrerad artificiell intelligens (AI), och dels i teorier för människa-datorinteraktion (MDI) och ny teknologi för att interagera och samarbeta med intelligenta mjukvaruagenter och miljöer. Kursen bygger på forskning och teoribildning i gränssnittet mellan AI och MDI, med särskilt fokus på socio-tekniska system som innefattar AI, människa-AI-samarbete och relaterade etiska och sociala aspekter.

Kursen är uppdelad i en teorimodul och en praktisk modul. I den praktiska modulen arbetar man i interdisciplinära projektteam med en utmaning relaterad till AI-baserade system för att förbättra hälsa eller stödja kliniskt beslutsfattande. Utmaningen definieras och genomförs i samarbete med aktörer inom hälso- och sjukvården.

Lärmål

Kunskap och förståelse

Efter avslutad kurs ska studenten kunna:

- (FSR 1) förstå, utveckla och utvärdera interaktiva AI-system som är proaktiva, reaktiva, emergenta, sociala och semi-autonoma, i samverkan med människor,
- (FSR 2) förklara hur vi ansvarsfullt kan designa interaktiva AI-system för att garantera transparens, ansvar, och följsamhet till intressenters och samhällets olika (sociala och kulturella) värderingar,
- (FSR 3) förstå människa-AI-interaktion som ett element av ett dynamiskt socio-tekniskt aktivitetssystem baserat på teorier om mänsklig aktivitet (inkluderande normer och värderingar), och hur detta kan översättas till beräkningsbara modeller användbara i system för människa-AI-interaktion och samarbete.

Färdighet och förmåga

Efter avslutad kurs ska studenten kunna:

- (FSR 4) kritiskt granska tillämpningen av teorier, metoder och verktyg för ansvarsfull utveckling av AI, och kunna identifiera resultat som baseras på vetenskapligt sunda metoder,
- (FSR 5) tillsammans med användare utveckla och utvärdera interaktiva AI-system och miljöer utifrån individuella, sociala och etiska perspektiv, som inkluderar trygghet, mångfald, lika rättigheter och ansvarsfull AI,
- (FSR 6) tillämpa relevanta teorier och metoder för att analysera, designa och konstruera interaktiva AI-system i samarbete med användare,
- (FSR 7) samarbeta i interdisciplinära team.
- (FSR 8) tillämpa ett socioteknisk designramverk för att fånga de systemiska faktorer som påverkar individen, och hur individen kan påverka systemet,
- (FSR 9) tillämpa designmetodik som gör det möjligt för människan att aktivt delta i design- och utvecklingsprocessen, och som framkallar de humana värden som ska främjas av systemet.

Värderingsförmåga och förhållningssätt
Efter avslutad kurs ska studenten kunna:

- (FSR 10) uppvisa kritiskt tänkande, etisk bedömningsförmåga, och förståelse för samhälleliga behov vid utveckling av interaktiva AI-system,
- (FSR 11) kritiskt utvärdera resultat från användares medverkan i designprocessen, och jämföra dessa med teoretiska, teknologiska och samhälleliga förväntningar,
- (FSR 12) att kunna reflektera över etiska, legala, sociala, personliga konsekvenser av AI samt konsekvenser för professioner och organisationer.

Kurs 3: Människa-AI-interaktion för hälsa och välmående 7,5 HP

Förkunskapskrav: AI-kurs 1

Kursen Människa-AI-interaktion har som huvudsakligt tema teorier, metoder och teknologier för utveckling av framtidens interaktiva AI-system avsedda att stödja människan att förbättra hälsa och välmående, exempelvis digitala hälsocoacher, eller utföra arbete inom hälso- och sjukvården, såsom interaktiva beslutsstöd. Fokus i kursen är på interaktionen, eller samarbetet, där människor och mjukvaruagenter kommunicerar och samarbetar i aktiviteter som är viktiga för människan. Ibland finns mjukvaruagenterna i robotar eller i andra artefakter/material i den fysiska miljön, såsom proteser eller hjälpmedel. Allt oftare är de inbäddade i digitala artefakter och materialiseras som människolika avatarer med kommunikationsförmåga, kroppsspråk och med inbäddad kunskap som relaterar till hälsa och mående. Dessutom är de i allt högre grad individ-anpassade, där information om personen kombineras med relevant domänkunskap.

Under denna kurs får studenten en djupare förståelse för och praktisk erfarenhet av olika metoder och teorier från området artificiell intelligens som syftar till att utveckla sådana interaktiva AI-system, t.ex. kunskapsgrafer, dialogsystem, igenkänning av mänskliga aktiviteter och emotioner. Paradigmer som blandad verklighet och virtuell verklighet diskuteras också som en del av interaktionsmodaliteterna mellan människor och intelligenta system. Studenten kommer att förvärva kunskaper om pågående forskning och experimentell praxis inom området människa-AI interaktion för bättre hälsa och välmående, samt utveckla färdigheter i design och utvärdering, samt kritisk reflektion kring etik och ”privacy”.

Denna kurs är liksom AI-kurs 2 uppdelad i en teorimodul och en praktisk modul. I den praktiska modulen arbetar man i interdisciplinära projektteam med en utmaning relaterad till AI-baserade system för att förbättra hälsa eller stödja kliniskt beslutsfattande. Utmaningen definieras och genomförs i samarbete med aktörer inom hälso- och sjukvården.

Lärmål
Kunskap och förståelse
Efter avslutad kurs ska studenten kunna:

- (FSR 1) förklara och karaktärisera olika paradigm inom artificiell intelligens relevanta för design och konstruktion av interaktiva AI-system som kan användas för hälsa och välmående (exempel: mänsklig-AI-symbios, människa-AI-samarbete, människa-AI-partnerskap, ubiquitous computing),

- (FSR 2) redogöra för de centrala frågeställningar som behöver beaktas i design av interaktiva AI-system utifrån perspektivet att systemet ska vara proaktivt, reaktivt, socialt och (semi-)autonomt för att anpassa sig till individens behov,
- (FSR 3) redogöra för vilka huvudsakliga typer av interaktiva AI-system som är i bruk idag för kliniskt beslutsstöd, och stödja hälsa och välmående, samt analysera dessa olika typers tekniska styrkor och svagheter för olika typer av tillämpningar,
- (FSR 4) förklara grunddragen i arkitekturer specifika för interaktiva AI-system samt exemplifiera olika tekniker som kan användas för att realisera interaktiva AI-system som syftar till att stödja individer i arbete och vardag,
- (FSR 5) redogöra för och tillämpa begrepp, metoder, och teorier för proaktiva, reaktiva, autonoma och sociala mjukvaruagenter som ska samverka med människan.

Färdighet och förmåga
Efter avslutad kurs ska studenten kunna:

- (FSR 6) demonstrera praktiska färdigheter i att kommunicera och integrera flera perspektiv (tex etiska, säkerhetsmässiga, personliga, samhällsmässiga) i design av intelligenta AI-system i en multiprofessionell arbetsprocess,
- (FSR 7) demonstrera praktiska färdigheter i att utveckla interaktiva AI-system,
- (FSR 8) demonstrera praktiska färdigheter att utforma och utvärdera proaktiva, reaktiva, autonoma och sociala agenter som samverkar med människan.

Värderingsförmåga och förhållningssätt
Efter avslutad kurs ska studenten kunna:

- (FSR 9) Kritiskt utvärdera och diskutera hur teorier och metoder underlättar eller begränsar förståelsen av konsekvenserna av AI-teknik på människans kognitiva, personliga, emotionella, fysiska, sociala nivå i ett kortsiktigt såväl som långsiktigt perspektiv,
- (FSR 10) värdera interaktiva AI-system från olika perspektiv (etiskt, säkerhetsmässigt, personligt, samhällsmässigt),
- (FSR 11) värdera kvaliteten i olika designförslag utifrån syftet och behovet av interaktiva AI-system.

Kurs 4: Examensarbete (fördjupningsarbete) i basämne med inriktning mot AI och hälsa, 15 eller 30 HP

Förkunskapskrav:

- Kandidatexamen i basämne
- Kurser/# poäng i basämnet
- AI kurs 1: Människo-centrerad AI för hälsa och välmående
- AI kurs 2: Ansvarsfull design av interaktiva AI-system för hälsa och välmående
- AI kurs 3: Människa-AI interaktion för hälsa och välmående

Studenterna förväntas ha genomfört kurserna 1-3 samt genomfört ett examensarbete där kunskapen tillämpas i ett eget-område-kontext.

Exempel på lokala mål

För att erhålla filosofie masterexamen i basämnet med inriktning mot artificiell intelligens och hälsa skall studenten kunna:

- Förstå och formulera på en abstrakt nivå en bredd av forskningsproblem i artificiell intelligens tillämpad i basämnets område och hur dessa är relaterade,
- förstå, förklara och använda de teorier, metoder och praktiska färdigheter som krävs för att kreativt bidra till att lösa forskningsproblem inom artificiell intelligens tillämpad inom basämnets område specifikt och inom hälso- och sjukvården generellt,
- förstå, analysera och förklara integrationen av artificiell intelligens i hälso- och sjukvården generellt och specifikt inom basämnets område,
- utvärdera AI-metoder, och processer genom vilka artificiell intelligens utvecklas.
- delta i forsknings- och utvecklingsarbete inom artificiell intelligens, samt
- aktivt och självständigt bedöma sitt eget kunskapsbehov samt kunna vidareutveckla sina färdigheter, förmågor och kunskaper inom området artificiell intelligens tillämpad inom hälso- och sjukvården.