



MØTEINNKALLING

Instituttstyremøte SM1/25

Tirsdag 25.februar 2025, kl. 12-13.30/14.00

V-sak 1/25

Godkjenning av innkalling og dagsorden

Forslag til vedtak: Instituttstyret godkjenner innkalling og dagsorden

O-sak 2/25

Regnskap for 3T 2024

Vedlegg: 2/25 – 1: Økonomirapport 3T 2024 ITS

Vedlegg: 2/25-2: Økonomirapportering 3T 2024 CENSSS

V-sak 3/25

Strategisk årsplan ITS 2025

Forslag til vedtak: Styret godkjenner strategisk årsplan for 2025.

Vedlegg: 3/25-1 Strategisk årsplan 2025

V-sak 4/25

Godkjenning av eksterne representanter til styret

Forslag til vedtak: Instituttstyret godkjenner forslagene fra FFI og IFE og ber fakultetsstyret om å oppnevne representantene Shahzad Ali fra FFI og Tine Uberg Nærland fra IFE som eksterne representanter i instituttstyret ved ITS for perioden 2025-2028.

Vedlegg: 4/25-1 Forslag til eksterne representanter i styret 2025-2028

Vedlegg: 4/25 -2 Oppnevning av eksterne representanter FFI

Vedlegg: 4/25 – 3 Oppnevning av eksterne representanter IFE

O-sak 5/25

Status tilsettinger



UNIVERSITETET
I OSLO

O-sak 6/25 HMS

O-sak 7/25 Eventuelt

V-sak 8/25 Nytt studieprogram: Master helseteknologi

Forslag til vedtak: Forslag til ny studieprogram i helseteknologi fremmes til MN-fakultetet innen frist 15.mars.

Vedlegg: 8/25-1 Utredning nytt studieprogram i helseteknologi

Cecilie Rolstad Denby
Instituttleder

MN - Økonomirapport for 2024

Enhet: Institutt for teknologisystemer	Koststed: 1560
Utarbeidet av: C. Rolstad Denby, M. Tronstad, P. Y Ingram og F. Bremnes	
 Signatur leder: 14.01.2025	

Innledning:

Institutt for teknologisystemer ble en del av UiO i 2017 som en del av Kjellersatsingen til UiO. Instituttet eksisterte før dette som en stiftelse, noe som gir ITS et noe annet bakteppe enn andre institutter ved MN. ITS har i større grad fokus på anvendt forskning og arbeidsstokken er preget av en stor andel toerstillinger. Lokaliseringen gir fordeler i et sterkt samarbeid med forskningsmiljøene på Kjeller. Antall studieplasser er foreløpig lavt sammenlignet med andre institutter, men instituttet er planlagt å skulle vokse med mange nye studieplasser i årene som kommer. Parallelt planlegger instituttet å vokse på den ekstern finansierte virksomheten og her inngår senteret CENSSS som en viktig del.

Ledelseskommentar

Årsresultatet for 2024 viser et mindreforbruk i forhold til budsjett da man ikke har fått gjennomført planlagte investeringer – i vente på ansettelse av fagfolk, permisjoner og anbudsinnhenting. Inntektene fra eksternfinansierte prosjekter er gledelig høyere enn budsjettet. Instituttet arbeider kontinuerlig med utvikling av utdanning og forskning for å nå en bærekraftig økonomi på sikt.

Økonomikommentar totalt

Instituttet er i ein alvorleg økonomisk situasjon fordi det vil ta tid før produksjonen er på eit nivå som er forsvarleg med tanke på årleg drift i balanse med aktuelle rammevilkår.

Instituttet hadde planlagt for større aktivitet enn det som faktisk er utført i 2024. Det er redusert aktivitetsnivå på personal, drift og investeringar. Det positive er eit større bidrag frå prosjekt enn venta. Det betyr at planlagt meirforbruk er vesentleg lågare enn venta og at forventa akkumulert meirforbruk vil kome seinare.

Regnskap vs langtidsbudsjett total - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-52 989 923	-59 292 813	-57 280 149	-57 739 319	-53 900 001
Personalkostnader	36 879 964	36 879 323	45 917 125	46 878 452	50 811 944
Driftskostnader	13 479 691	15 006 783	14 252 285	16 964 787	19 109 271
Investeringer	4 261 380	443 633	634 065	1 244 145	2 500 000
Nettobidrag fra ekstern..	-399 385	-963 230	-1 541 469	-113 206	175 000
Prosjektavslutning	0		0		
Overforbruk BOA	0	0	0	0	
Isolert resultat	1 231 728	-7 926 304	1 981 856	7 234 860	18 696 214
Overført fra i fjor	-10 225 033	-8 993 306	-16 919 609	-14 937 753	-13 000 000
Akkumulert resultat	-8 993 306	-16 919 609	-14 937 753	-7 702 893	5 696 214

BOA

Regnskap vs langtidsbudsjett BOA - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-7 313 572	-11 430 937	-17 576 114	-16 349 155	-15 907 001
Personalkostnader	5 731 156	6 961 485	9 328 957	9 904 776	9 544 200
Driftskostnader	727 664	1 130 712	1 066 616	1 481 028	2 045 271
Investeringer	23 753	0	0	56 038	
Nettobidrag fra eksternfinansi..	993 200	3 233 728	7 036 311	5 981 050	4 317 530
Prosjektavslutning	178 566		-81 562		
Overforbruk BOA	-340 768	105 011	225 793	9 964	
Overført fra i fjor					
Grand Total	0	0	0	1 083 700	0

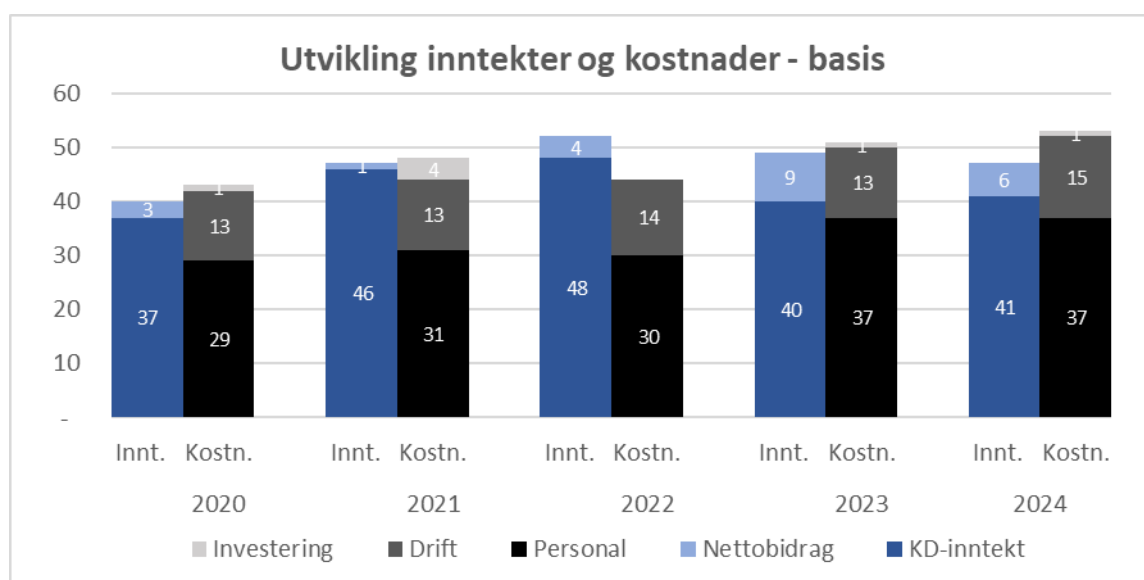
Aktivitetsnivået er som forventet i forhold til det planlagte nivået. Det er et lite avvik i både inntekter og driftskostnader. En mulig årsak til dette kan være at Rehsys-prosjektet ikke ligger inne i systemet. Driftskostnader er lavere enn planlagt, men litt høyere enn i 2023, noe som tyder på at vi muligens har overestimert forbruket. Når det gjelder nettobidraget, er det litt høyere enn budsjettet, delvis på grunn av leiested.

Bevilgning

Regnskap vs langtidsbudsjett bevilgning - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-45 676 351	-47 861 876	-39 704 035	-41 390 164	-37 993 000
Personalkostnader	31 148 808	29 917 838	36 588 168	36 973 677	41 267 744
Driftskostnader	12 752 027	13 876 071	13 185 669	15 483 760	17 064 000
Investeringer	4 237 628	443 633	634 065	1 188 108	2 500 000
Nettobidrag fra eksternfinansi..	-1 392 585	-4 196 957	-8 577 780	-6 094 256	-4 142 530
Prosjektavslutning	-178 566		81 562		
Overforbruk BOA	340 768	-105 011	-225 793	-9 964	
Isolert resultat	1 231 728	-7 926 304	1 981 856	6 151 160	18 696 214
Overført fra i fjor	-10 225 033	-8 993 306	-16 919 609	-14 937 753	-13 000 000
Akkumulert resultat	-8 993 306	-16 919 609	-14 937 753	-8 786 594	5 696 214

Resultatet er vesentleg betre enn venta, og dette skuldast i hovudsak for optimistisk budsjettering av auke på personal og for låg budsjettering av inntekt. Dette gjeld tilleggstilendingar samt offentlege refusjonar og inntekt frå leiested. Det er og element av uryddig budsjettkvalitet, særskilt på personal med omsyn til starttidspunkt og finansiering. Figuren viser at 90 % av KD-inntekt går til personalkostnader og at isolert resultat i form av avstand mellom inntekter og kostnader er aukande frå 2023.



MN - Økonomirapport for 2024

Enhet: CENSSS	Koststed: 15602x
Utarbeidet av: Phonnipha Yingram	
 Signatur leder: 14.01.2025	

Innledning:

CENSSS (Centre for Space Sensors and Systems) er et NFR finansiert senter som sorteres under ITS (Institutt for teknologisystemer). CENSSS jobber med vitenskapelige og teknologiske utfordringer og forretningsområder innen småsatellitter for jordobservasjon og innen utforskning av månen og planetene. Senteret er i likhet med ITS lokalisert på Kjeller og samarbeider med forskningsmiljøene i nærområdet.

Ledelseskommentar

CENSSS har nå fått en bemanning som gjør at aktivitetsnivået økes. Senteret skal evalueres av NFR medio januar, og det forventes at finansieringen videreføres.

Økonomikommentar

Aktivitetsnivået er som forventet i forhold til det planlagte nivået for 2024. CENSSS har ansatt flere på senteret, noe som resulterer i økte personalkostnader i forhold til 2023. Driftskostnadene og investeringsnivået er en del lavere enn budsjetterte, hovedsakelig på grunn av bekymringer for at det ikke vil være nok midler til å dekke satellittkostnaden.

Totalt

Regnskap vs langtidsbudsjett total - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-1 378 089	-7 558 809	-8 618 521	-10 807 134	-10 200 000
Personalkostnader	1 415 799	4 762 884	2 105 448	6 681 130	5 923 944
Driftskostnader	588 269	1 796 612	1 474 040	1 698 035	2 800 000
Investeringer		1 215 393	207 936	144 517	300 000
Nettobidrag fra ekstern..	433 260	1 013 230	1 626 469	134 006	0
Isolert resultat	1 059 238	1 229 310	-3 204 627	-2 149 445	-1 176 056
Overført fra i fjor	4 458	1 063 696	2 293 006	-911 621	
Akkumulert resultat	1 063 696	2 293 006	-911 621	-3 061 067	-1 176 056

Det er et lite avvik i driftskostnader, men dette forventes å trappe seg opp igjen etter anskaffelsesprosessen av satellitten.

BOA

Regnskap vs langtidsbudsjett BOA - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-1 362 115	-5 558 809	-6 618 521	-8 765 634	-8 200 000
Personalkostnader	627 949	1 817 974	2 354 689	4 456 129	2 820 000
Driftskostnader	492 037	1 597 953	1 470 192	1 674 659	2 800 000
Investeringer		1 215 393	207 936	144 517	300 000
Nettobidrag fra eksternfinansi..	242 130	927 488	2 585 704	2 490 328	2 280 000
Overført fra i fjor					
Grand Total	0	0	0	0	0

Det er et lite avvik i personalkostnader, pga. høyere ansettelsesnivå på prosjektet enn planlagt.

Bevilgning

Regnskap vs langtidsbudsjett bevilgning - klikk på +/- for å drille

	Regnskap 2021	Regnskap 2022	Regnskap 2023	Regnskap 2024	Prognose 2024
Inntekter	-15 974	-2 000 000	-2 000 000	-2 041 500	-2 000 000
Personalkostnader	787 850	2 944 909	-249 241	2 225 001	3 103 944
Driftskostnader	96 232	198 658	3 848	23 376	
Investeringer					
Nettobidrag fra eksternfinansi..	191 131	85 742	-959 234	-2 356 322	-2 280 000
Isolert resultat	1 059 238	1 229 310	-3 204 627	-2 149 445	-1 176 056
Overført fra i fjor	4 458	1 063 696	2 293 006	-911 621	
Akkumulert resultat	1 063 696	2 293 006	-911 621	-3 061 067	-1 176 056

Ingen vesentlige avvik. Personalkostnader er overbudsjettet, noe som burde samsvare med basisbevilgningen.

Tiltak	Beskrivelse	Ansvarlig	Tidsfrist
Ledelse og arbeidsmiljø			
Utvikling av seksjonslederroller og fagligutvalgslederroller ved ITS	Forsknings og studieutvalg. PhD-utvalg Studieprogramsledere og koordinatore for studieretninger Nestleder Seksjonsleder	Instituttleder, ledergruppe og alle seksjons- og utvalgsledere	Utgang 2025
Arbeidsmiljø/HMS	ARK	Instituttleder/adm.sjef	Desember 2025
Strategi og omdømmebygging			
Strategi 2026-30	Revisjon av ITS strategi for perioden	Instituttleder/adm.sjef	Desember 2025
Utredning lokaler	Rapport til MN. Utvikling på Kjeller.	Instituttleder/ledergruppe	Juni 2025
Kommunikasjonsplan	Websider. Visuell profilering av ITS sin virksomhet. Bruk og organisering av Teams	Kommunikasjonsforum/ledergruppe	Juni 2025
Studieutvikling			
Videreutvikling av ITS masterstudier og studieadministrasjon	Utvikling rundt vår nyansatte. Veiledning intern og eksternt, store studentgrupper. Utvikling av studieadministrasjon (skriftliggjøring rutiner f.eks)	Utdanningsleder Studieprogramsledere/koordinatore	Desember 2025
Utredning om Bachelorutdanning ved ITS	Bachelor i teknologisystemer. Innspill til MN (15. mars 2026)	Utdanningsleder	Desember 2025
Utredning bærekraftige energisystemer: teknologi, samfunn og miljø	Studieretning i samarbeide med SUM/ Bærekrafthuset	Energiseksjonen/utdanningsleder	Desember 2025
Studieretning sikkerhet i cyberfysiske systemer	Ansettelse, kursbemanning	Seksjonsleder/utdanningsleder/studieretningskoordinator/studieleder/adm sjef/instituttleder	Desember 2025
Studieprogram i helseteknologi	Ansettelser og utredning	Instituttleder/utdanningsleder	Desember 2025
Forskning			
Laboratorier for forskning og undervisning	Planlegging. DESSI.	Ledergruppen	Desember 2025
Investeringer	Prioritering og innkjøp	Ledergruppe	Juni 2025

Incentivordning for ekstern forskningsfinansiering fra EU	Videreføring av deler av incentiv fra MN for ekstern finansiering fra EU utredes.	Forskningsutvalgsleder/ITS ledergruppe	Juli 2025
Leiested laboratorier	Det etableres leiested for laboratorier, bl.a for at kostnader kan belastes i eksternfinansierte prosjekter. Ledergruppe beslutter hvilke laboratorier etter en kartleggingsprosess.	Administrasjonssjef	Juni 2025
Utvikling av forskningsadministrativ tjeneste	Dialog forskningsutvalg/administrasjon om administrativ forskningsstøtte/rutiner	Forskningsutvalgs-leder/administrasjonssjef	Desember 2025



V- Sak 05/25 Forslag til eksterne representanter i styret 2025-2028

Instituttstyret ved Institutt for teknologisystemer (ITS) består av 9 representanter hvorav to er eksterne, en fra IFE og en fra FFI.

Fra IFE har Tine Uberg Nærland vært representert siden 2021 og fra FFI har Torunn Øvreås vært representant i to perioder, fra 2017-2021, og fra 2022-2024. Representantene sitter for 4 år av gangen og kan sitte i inntil to perioder. Det er nå tid for å oppnevne/gjenoppnevne nye representanter. Det er fakultetsstyret som til slutt oppnevner de eksterne representantene.

FFI har foreslått Shahzad Ali som ny representant fra FFI og IFE har foreslått å gjenoppnevne Tine Uberg Nærland, begge for perioden 2025-2028.

Vedlagt følger forslagsbrevene fra:

- FFI. Vedlegg 5_25_2
- IFE. Vedlegg 5_25_3

Forslag til vedtak: Instituttstyret godkjenner forslagene fra FFI og IFE og ber fakultetsstyret om å oppnevne representantene Shahzad Ali fra FFI og Tine Uberg Nærland fra IFE som eksterne representanter i instituttstyret ved ITS for perioden 2025-2028.



Universitetet i Oslo (ITS)
The Department of Technology SystemsKjeller

Dato:
06.02.2025

Vår referanse:
20/03139-7

Saksbehandler:

Deres referanse:

Oppnevning av representant til instituttstyret ved ITS

Viser til deres brev av 6. januar i år.

FFI ønsker å oppnevne seniorrådgiver Shahzad Ali til ny representant til instituttstyret ved ITS for perioden 2025 til 2028. Ta gjerne kontakt direkte med undertegnede for mer informasjon om vår oppnevnte representant.

Med hilsen

Bård Erlend Galåen

Dette dokumentet er elektronisk godkjent og har derfor ikke håndskreven signatur.

Kopi til:

Vedlegg:





UNIVERSITETET
I OSLO

Vedlegg 5/25- 3 Oppnevning av eksterne representanter IFE

Nominasjon mottatt per e-post, 03.02.2025.

Hei Marit,

På veiene av IFE ønsker jeg da å nominere Tine Nærland som representant til instituttstyret ved ITS med Ragnhild Hancke som vara. Tine har som dere vet en profil som gjør henne spesielt godt egnet til å sitte i styret for å bidra til videre utvikling av instituttet. IFE er også opptatt av ITS videre utvikling og tilknytningen til Kjellermiljøene og jeg tror det er en god ide å ta med Tine i styret for å ivareta de perspektivene denne tilknytningen har.

Martin Smedstad Foss, Ph.D.

Vice President

IFE Research and Development

Master's Degree Study Program in Healthcare Technology at the Department of Technology Systems, UiO

The recently published government report “*Tid for Handling*”¹ underscores the critical need for developing and implementing innovative healthcare solutions to maintaining adequate patient support and efficient operation of the healthcare system at reduced human and financial resources. The strategic plans of Norwegian hospitals have also emphasized the need for developing new digital Artificial Intelligence (AI)-based tools, which crucial for enhancing patient treatment and advancing the Research and Innovation domain^{2, 3}. Given the increasing complexity of healthcare challenges, solving these issues effectively requires a multidisciplinary approach that integrates expertise from both the Health Sciences as well as Science, Technology, Engineering, and Mathematics (STEM).

To address this need, the proposed master's degree program aims to educate graduates at the forefront of healthcare technology research and development, bridging the gap between healthcare and technology through a strong emphasis on real-world applications. The program will be hosted at the Department of Technology Systems (ITS) at the University of Oslo (UiO) and executed in a close collaboration with the Department of Informatics (IFI) and the Department of Physics (FYS). The program's goal is to equip students with the knowledge and skills necessary to develop innovative healthcare solutions to ultimately enhance patient care, through recognizing and addressing pressing healthcare challenges.

By offering two curriculum tracks — one for students with Health Sciences backgrounds, and one for students from STEM — the program ensures that each group builds a robust foundation in its respective area. At the same time, the program promotes deep collaboration and cross-exchange of ideas among students, through shared courses, joint projects, and integrated research opportunities. This approach enables students from both tracks to work closely together, learn from each other to collectively develop and implement cutting-edge healthcare technologies that address both current and emerging healthcare needs.

The proposed program's name, Healthcare Technology (as opposed to Medical Technology), reflects its broad and multidisciplinary scope. While this study offer focuses on advancing medical diagnostics and treatments, it also integrates elements of innovation in healthcare delivery systems, remote patient monitoring and community-based public health initiatives. This comprehensive scope ultimately aims at improving both patient care and enhance operational efficiency of healthcare delivery.

¹ Tid for handling — Personellet i en bærekraftig helse- og omsorgstjeneste. Utredning fra et utvalg oppnevnt ved kongelig resolusjon 17. desember 2021, Departementenes sikkerhets- og serviceorganisasjon Teknisk redaksjon, NOU 2023:4

² Områdeplan Pasientbehandling 2024-2027, Planeier: Direktør medisin, helsefag og beredskap, OUS

³ Områdeplan Forskning og innovasjon 2024-2027, Planeier: Direktør forskning, innovasjon og utdanning, OUS

1. Background

Aging populations and advances in precision medicine are steadily increasing the workload on healthcare professionals, requiring them to meet higher demands and adapt to more complex needs of care. At the same time, technological progress offers opportunities to enhance quality of patient care, improve patient outcomes, and increase the healthcare system efficiency in general. Creating and implementing impactful technology-based solutions to address these real-world challenges requires professionals with deep technological expertise and a comprehensive understanding of the healthcare system complexities.

1.1 Existing Related Study Programs in Norway

Several academic programs have emerged across Norway to address the growing need for such expertise. The Norwegian University of Science and Technology (NTNU) offers: 1) a specialization in Biophysics and Medical Technology as part of their integrated 5-year master's degree program in Physics and Mathematics, and 2) a part-time master's degree program in Health Informatics for healthcare professionals and software engineers with work experience. The Arctic University of Norway (UiT) provides a specialization in Medical Informatics within a 5-year civil engineering program in Informatics, while the University of Bergen (UiB) offers a 5-year integrated civil engineering master's degree in Medical Technology. Additionally, the University of Stavanger (UiS) has established a 3-year bachelor's degree program in Medical Technology. Oslo Metropolitan University (OsloMet) is currently the only university in Norway that offers a stand-alone master's degree program in Health and Technology not directly integrated with a bachelor's degree. The program can be completed in two or three years, for the specialization in Biomedicine and Radiography or Assisting Technology in Health, respectively.

1.2 Related Study Programs at UiO

UiO currently lacks a dedicated study program in Healthcare Technology. The closest alternatives include: 1) a study option in Biological and Medical Physics within the master's degree program in Physics, and 2) a master's degree program in Digitalization in the Health Sector offered by IFI.

The study option in Biological and Medical Physics is mostly focusing on how ionizing radiation, electrical and magnetic fields and thermal effects influence biological systems. Furthermore, on how these fundamental mechanisms can be utilized for therapy or medical imaging. Hence, this study offer has a much more narrow scope than what is aimed for in the new Healthcare Technology master's degree program.

The Digitalization in the Health Sector on the other hand prepares students to become leaders and managers of digital transformation within the health sector. This program provides a strong foundation in applications, governance, and strategic integration of Information and Communication Technology (ICT) within healthcare organizations. It emphasizes the organizational, ethical, and societal implications of digital solutions, preparing graduates to oversee digital health initiatives and infrastructure. It focuses on selection, integration, and management of diverse digital tools and systems, incorporating user-centric design and ethical considerations. As such, its scope and objectives differ from the currently proposed program in Healthcare Technology, which emphasizes development of innovative healthcare technologies and their integration with AI-based advancement.

1.3 Aims and Relevance of the Proposed Master's Program

The proposed new master's degree in Healthcare Technology aims to bridge the gap in UiO's existing programs ~~by combining digital and physical healthcare innovation~~. With a strong emphasis on hands-on experimentation, prototyping, and practical application of scientific principles and engineering, the program is designed to equip students with tools to effectively map, analyze, and solve complex healthcare problems. Building on the existing expertise in medicine, technology, and digitalization at UiO, the program seeks to foster new synergies and strengthen collaboration across this multidisciplinary landscape. The program will be housed at ITS with strong and equal partnerships with FYS and IFI to ensure a comprehensive technological and scientific foundation. All the departments will have equal rights to be main supervisors for the master students.

Aligned with the UiO Strategy 2030, the proposed program reflects the university's commitment to educate student with knowledge, skills, and ambition to create a better world. Focusing on the development of interdisciplinary knowledge and practical skills in close collaboration with relevant stakeholders, the curriculum is designed to prepare graduates to effectively tackle real-world challenges within healthcare system.

The relevance of the proposed study program is additionally underscored by the current demographic shifts with an aging population and rural communities, which will require technological solutions to ensure secure and equitable access to quality healthcare. The skilled workforce graduating from this program will be crucial for meeting the demands imposed by the modern and increasingly complex healthcare system. As Norway strives to lead in technological innovation, educational offers that create competent professionals are essential. We are confident that the proposed master's in Healthcare Technology will educate individuals, who will drive research and innovation activities in hospitals, health-tech companies, and research institutions. By focusing teaching and learning approaches on both health technology development and its effective implementation, the program ensures that the graduates will be equipped with knowledge and skills to successfully bridge the gap between research and clinical practice. Finally, the program extends beyond the purely technological aspects and provides students with a broader picture of healthcare complexity. The students will additionally gain insight into the national/international regulatory landscape and will learn how to assess economic feasibility of the developed innovative solutions. In this way, the program will provide these young people with a holistic view on how new technologies can be successfully developed into a product that is successfully implemented and integrated within the healthcare system.

2. Main Program Goals and Highlights

The proposed program in Healthcare Technology is designed to meet the urgent demand for advanced and integrated solutions in healthcare.

The program focuses on the following main objectives:

- **Innovative Healthcare Solutions:** Equip students with knowledge and skills to develop and implement cutting-edge technologies with a strong emphasis on machine learning, robotics, and biosensors
- **Interdisciplinary Collaboration:** Foster collaborative attitudes and interdisciplinary mindset between students with STEM and Health Sciences backgrounds to address healthcare challenges through integrated, multidisciplinary educational activities and close involvement of (ITS, IFI, FYS as well as collaborating hospitals
- **Leadership, Technology implementation and Entrepreneurship:** Prepare graduates to create and effectively implement technological advancements in healthcare systems to manage projects and drive innovation in real-world settings
- **Close collaboration with Relevant Stakeholders:** Immerse students in the national healthcare system, through strong and integrated collaborative networks that include hospitals, clinics and industrial actors, to provide them with in-depth practical experience, and to ensure the relevance and applicability of the competencies gained through this study program

Key program highlights include:

- **Crossdisciplinary Approach:** Combines expertise from healthcare and technology to advance state-of-the-art medical innovations and develop clinically relevant, impactful solutions
- **Problem-based Learning through Hands-On Practical Projects:** Provides practical experience through project-based learning, enabling students to learn through real-world scenarios. Master projects will be conducted in close collaboration with collaborating hospitals (Oslo University Hospital, Sunnaas Rehabilitation Hospital, Gaustad Hospital and Akershus University Hospital) and industrial partners, providing direct connections to the healthcare sector.
- **Global Perspective:** Enriches education by offering exchange opportunities and collaborations with the relevant international institutions (e.g., Institute of Biomedical Engineering/ the University of New Brunswick, Canada; Biomedical Microsystems Laboratory/ Laval University, Canada; Biomedical Engineering/ Chalmers University of Technology, Sweden).
- **Inclusive Healthcare Focus:** Acknowledges mental health as an integral component of healthcare and is committed to addressing it within its curriculum and master thesis opportunities.

4. Admission Requirements

The minimum prerequisite requirement is a bachelor's degree comparable to a Norwegian bachelor's degree. The applicant must have a minimum average grade equivalent to a Norwegian C in the required courses. A Norwegian C is described as a good grade, generally comparable to an American B grade and a Second-Class Upper grade in the British system. No conversion tables will be used for foreign grades. Foreign education will be assessed individually during the admission process. Eligible applicants will compete for a study place in the study program. The ranking will be created based on the detailed selection criteria.

Due to the interdisciplinary nature of the program, the recruitment will include admission to two study options (hereafter referred to as study tracks); one for students with STEM backgrounds and another one for students with Health Science backgrounds (Figure 1).

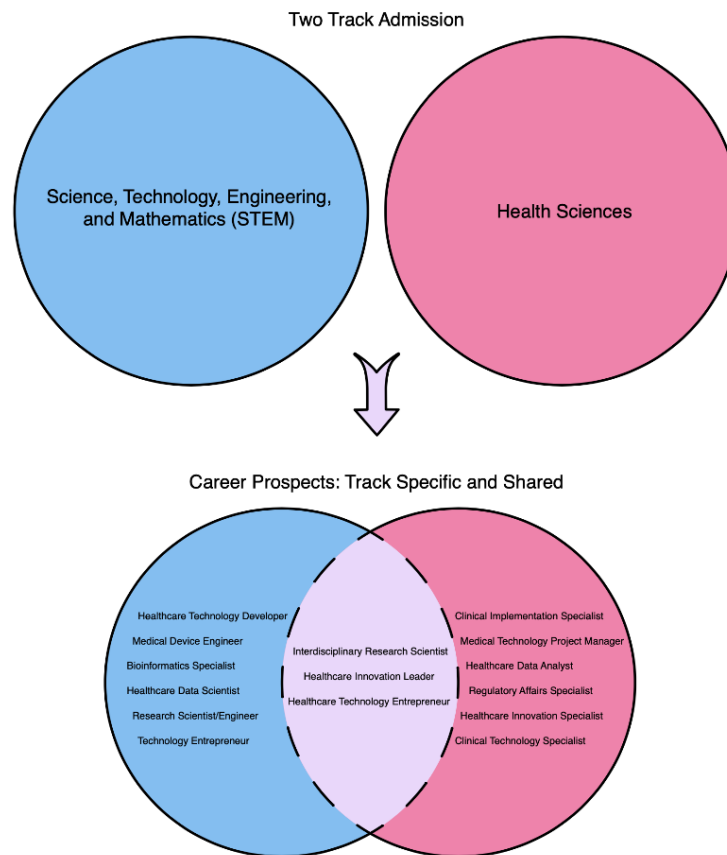


Figure 1. The multidisciplinary aspect of the master's degree study program in Health Technology and its impact on graduates' career prospects.

4.1 Admission criteria for applicants with a background in STEM

The required courses shall consist of minimum 80 ECTS credits, including 30 ECTS credit courses at the lowest level (1000 courses) and 20 ECTS credit courses on advanced levels (2000 and 3000 courses). The curriculum shall include:

- 20 ECTS credits within programming
- 20 ECTS credit within mathematics or statistics
- 40 ECTS credit within natural sciences selected from up to three of the following fields:
 - Mathematics
 - Informatics/Cybernetics
 - Physics
 - Electronics
 - Bioinformatics

4.2 Admission criteria for applicants with a background in Health Sciences

The minimum prerequisite requirement is a bachelor's degree (or equivalent) in Medicine, Dentistry, Nursing, Physiotherapy, Radiography, Pharmacy, Psychology, Ergotherapy, Social Workers, or other relevant fields.

As part of the admission process, all applicants must submit a one-page letter of motivation detailing their academic background, relevant experiences, aspirations, and reasons for pursuing this specific study program. The letter, along with the academic grades, will be the basis of a comprehensive evaluation, during which candidates' qualifications, motivation, and alignment with the program's goals will be assessed.

The program will also strive to maintain a mixed student's cohort with 50% from each of the mentioned backgrounds. This approach will enable the multi-/interdisciplinary teaching and learning methods objectives.

4.3 Language requirement

Admission to the program will be based on the standard Norwegian and/or English language requirements

5. Learning Outcomes

The learning outcomes of the master's degree program in Healthcare Technology outline the expected knowledge, skills, and general competencies to be attained by graduates, including track-specific elements for STEM and Health Sciences students, as well as outcomes for all graduates.

5.1 Knowledge

5.1.1 Track specific learning outcomes for students with a background in STEM

- Acquire foundational medical knowledge of human anatomy, physiology, medical conditions, as well as the Norwegian healthcare system to inform the design and development of advanced healthcare technologies addressing real-world clinical challenges

5.1.2 Track specific learning outcomes for students with a background in Health Sciences

- Understand foundational technological concepts, encompassing programming, machine learning, robotics, and human-machine interaction, to effectively collaborate in healthcare technology development.
- Acquire working knowledge of programming principles relevant for data analysis and software development for healthcare technologies

5.1.3 Shared learning outcomes

- Comprehend of the complex and multidisciplinary nature of healthcare technology development
- Gain an overview of the regulatory landscape relevant for healthcare technology development and implementation
- Understand the economic considerations that shape the healthcare system as well as business strategies necessary for the implementations and adoption of new technological solutions in the healthcare system
- Acquire solid knowledge of the fundamentals of research methodology, including experimental design, data analysis and reporting
- Overview of medical device engineering principles

5.2 Skills

5.2.1 Track specific learning outcomes for students with a background in STEM

- Proficiency in programming languages relevant for data analysis, machine learning, and healthcare technology development (e.g., Python)
- Ability to design, develop, and test healthcare technology prototypes

5.2.2 Track specific learning outcomes for students with a background in Health Sciences

- Translate clinical insights and domain understanding into functional requirements for technology solutions
- Ability to develop holistic implementation strategies of technological solutions for healthcare systems
- Basic proficiency in programming necessary for data analysis, machine learning and healthcare technology development

5.2.3 Shared learning outcomes

- Ability to critically evaluate scientific literature and apply evidence-based approaches to healthcare innovation

- Capacity to identify real-world healthcare challenges and develop innovative solutions
- Ability to critically assess the impact of various technological solutions on the healthcare system operations
- Ability to communicate and collaborate effectively in multidisciplinary teams, integrating diverse expertise to develop, execute and manage innovative projects within the healthcare technology

5.3 General Competences

5.3.1 Track specific learning outcomes for students with a background in STEM

- Ability to communicate effectively with clinicians, hospital staff, and other healthcare professionals
- Fluency in basic medical terminology, as well as workflows and priorities in healthcare

5.3.2 Track specific learning outcomes for students with a background in Health Sciences

- Capacity to effectively communicate with technology developers across the broad spectrum of healthcare technologies, ensuring clinically relevant and user-centered innovations
- Ability to adapt quickly to rapidly evolving needs in technology and healthcare system's landscapes

5.3.3 Shared learning outcomes

- Ability to effectively communicate and collaborate in multidisciplinary teams to address complex healthcare challenges
- Capacity to translate technological advancements into practical, clinically relevant healthcare solutions
- Ability to oversee healthcare technology development projects, emphasizing problem-solving and effective interdisciplinary communication to foster impactful healthcare innovation
- Capability to contribute ethically, creatively, and effectively to the development and implementation of innovative solutions that address complex challenges to promote positive outcomes in diverse systems and environments

6. Career Prospects

The master's program in Healthcare Technology is designed to attract highly motivated students with backgrounds in STEM or Health Sciences and offer them career paths tailored for their background, as well as interdisciplinary opportunities. The program graduates are expected to be well prepared to excel in a rapidly growing and transformative healthcare field. The program, with its emphasis on interdisciplinary collaborations, hands-on innovation, and technology implementation, will equip young professionals with relevant knowledge and a diverse set of skills, preparing them to contribute to the future of healthcare. The Healthcare Technology Master's prepares graduates for careers that have a direct impact on the future of healthcare by creating the next generation of leaders, innovators, and problem solvers in the healthcare technology sector.

6.1 Career Opportunities for Graduates with a STEM background

Graduates with a background in STEM will have a strong foundation for roles requiring a high degree of technical proficiency. Possible career paths include:

- **Healthcare Technology Developer:** Designing and building innovative software, robotic, AI, and biosensor technologies
- **Medical Device Engineer:** Developing and testing new medical devices and instruments
- **Bioinformatics Specialist:** Analyzing large-scale biological/medical datasets to drive research and innovation
- **Healthcare Data Scientist:** Applying AI and machine learning to extract insights from medical data
- **Research Scientist/Engineer:** Developing and conducting basic and applied research in cutting edge healthcare technology
- **Healthcare Technology Entrepreneur:** Starting new healthcare technology ventures

6.2 Career Opportunities for Graduates with a Background in Health Sciences

Graduates with a background in Health Sciences will be uniquely positioned to leverage their clinical knowledge and understanding of healthcare workflows. Possible career paths include:

- **Clinical Implementation Specialist:** Integrating new technologies into clinical practice and healthcare systems
- **Medical Technology Project Manager:** Overseeing projects to develop and implement healthcare technologies
- **Healthcare Data Analyst:** Applying data analysis skills within a clinical and research context
- **Regulatory Affairs Specialist:** Ensuring compliance of healthcare technologies with safety and ethical standards
- **Healthcare Innovation Specialist:** Leading the evaluation of new technologies and improving healthcare delivery
- **Clinical Technology Specialist:** Conduct pilot studies and clinical experiments to better assess impact and quality of new technologies

6.3 Shared Career Opportunities for All Graduates

Both STEM and Health Science graduates will have opportunities to pursue roles that bridge the gap between these fields, possible career paths include:

- **Healthcare Technology Consultant:** Advising healthcare organizations on the adoption of new technologies and optimizing user experience
- **Interdisciplinary Research Scientist:** Contributing to research projects that combine technical and clinical expertise
- **Healthcare Innovation Leader:** Driving the development, adoption and implementation of healthcare technologies
- **Healthcare Technology Entrepreneur:** Starting and leading new companies focused on providing healthcare solutions

7. The Study Program Structure

Semester	Courses / Learning Activities		
1 st	Health Science background students: Introduction to Programming (IN1000)	Introduction to Machine Learning for Healthcare Technology (TEK5/4000)	Applied Research and Development in Healthcare Technology (TEK5/4000) (introduction to a Master Thesis)
	STEM background students: Introduction to Medicine for Healthcare Technology (TEK5/4000)		
2 nd	Healthcare Technology Implementation (TEK5/4000)	Elective Course	Elective Course
3 rd	Elective Course	Master Thesis	Master Thesis
4 th	Master Thesis	Master Thesis	Master Thesis
	10 ECTS credits	10 ECTS credits	10 ECTS credits

1st semester/ Autumn:

Three foundational courses (two common courses and one separate for each study track bridging students' knowledge gaps)

The track for the STEM students:

- Introduction to Machine Learning for Healthcare Technology – 10 ECTS credits
- Applied Research and Development in Healthcare Technology (written introduction to a master thesis) – 10 ECTS credits
- Introduction to Medicine for Healthcare Technology – 10 ECTS credits

The track for the Health Science students:

- Introduction to Machine Learning for Healthcare Technology – 10 ECTS credits
- Applied Research and Development in Healthcare Technology (written introduction to a master thesis) – 10 ECTS credits
- Introduction to Programming (IN1000) – 10 ECTS credits

2nd semester/ Spring:

- Healthcare Technology Implementation (mandatory, inspired by HECON4100, TEK5350, LSI4015) – 10 ECTS credits
- Two elective courses – 2 x 10 ECTS credits

3rd semester/ Autumn:

- Elective course – 2 x 10 ECTS credits
- Master thesis – 20 ECTS credits

4th semester/ Spring:

- Master thesis – 30 ECTS credits

List of the Suggested Elective Courses (non-exhaustive, to be updated)

Course Code	Title	Semester	Department
FYS4250	Biomedical Instrumentation	Autumn	FYS
TEK5030	Computer Vision	Spring	ITS
IN4190	Digital Signal Processing	Fall	IFI

Master Projects:

- Developed and executed in a partnership with collaborating hospital partners (Oslo University Hospital, Akershus University Hospital, Sunnaas Rehabilitation Hospital, Gaustad Hospital) and industrial partners
- Student exchange program with Canada and Sweden
- Unique Selling Point (USP): The program recognizes mental health as an integral part of the healthcare research and development. This ensures that innovations address both physical and mental well-being, leading to more effective, patient-inclusive care solutions and preparing graduates to tackle diverse, multifaceted healthcare challenges

8. Overview of the program courses

8.1 Introduction to Machine Learning for Healthcare Technology (mandatory for both study tracks)

This course is an introductory module to machine learning (ML) and deep learning (DL) that provides students with a background and overview of ML & DL applications in health sciences, with particular emphasis on biosignal analysis along with image analysis and segmentation. The course delves into various ML approaches, including supervised, unsupervised, and reinforcement learning, and their utilization for real-world biomedical data analysis. Furthermore, the course will introduce the concept of federated learning, a particularly relevant machine learning framework within healthcare due to its ability to train models on decentralized and privacy-sensitive patient data across multiple institutions. This approach addresses the critical need to analyze large, diverse datasets while adhering to stringent data privacy regulations in healthcare.

Learning Outcomes:

- **Comprehension of ML Algorithms:** Gaining an understanding of essential ML algorithms and their applications in the health science field
- **Practical Application:** Learning how to effectively apply ML techniques for biosignal processing and medical image analysis and segmentation including multimodality and multidimensional modelling
- **Handling Data Challenges:** Identifying and addressing specific challenges in health science data analysis, such as data sparsity including generative AI, variance, and non-Independent and Identically Distributed (I.I.D.) characteristics. Machine learning frameworks are particularly relevant from the healthcare technology perspective, including federated learning
- **Regulatory and Ethical Insights:** Developing a broad understanding of the regulatory framework and ethical implications of AI utilization in the healthcare sector
- **Practical use of ML algorithms:** Acquiring hands-on skills and experience in designing and implementing the ML-based solutions for the health science and biotechnology problems

8.2 Applied Research and Development in Healthcare Technology (mandatory for both study tracks)

This course is a cornerstone of the master's degree program, offering an intensive, hands-on experience in collaborative innovation and technology development within the healthcare sector. By bringing together students from diverse STEM and Health Science backgrounds, it fosters deep interdisciplinary collaboration.

Selecting a Thesis Topic and Project

At the start of the semester, each student chooses a master's thesis topic from a list suggested by academic, industry, and hospital partners. Based on their chosen topic, students then select a semester-long project from a range of open-ended challenges proposed by these same stakeholders in academia,

healthcare, and industry. These challenges focus on developing innovative, real-world solutions and require students to apply the latest research and state-of-the-art methods.

Team Formation and Collaboration

Students will form teams of three to four members, intentionally mixing STEM and Health Science backgrounds to ensure diverse perspectives and expertise. Each team tackles one of the proposed challenges, devising and implementing a practical solution over the course of the semester.

Simultaneously, each student conducts an individual, targeted literature review directly related to both their thesis topic and the team project.

Guidance, Workshops and Peer Review

Throughout the project, teams receive guidance from a principal investigator (PI), who represents the stakeholder (industry, academia, or hospital) that proposed the challenge. Students also attend workshops covering research methodologies and technical implementation strategies. At the end of the literature review phase, each student prepares a background section for their thesis, which is then peer-reviewed by a teammate—exposing students to the peer-review process and further strengthening the program’s multidisciplinary approach.

Final Deliverables

As a culminating activity, each team designs, implements, and tests their proposed solution, integrating insights from the individual literature reviews. Teams conclude by delivering a conference-style presentation, detailing the background, methodology, and results of their project. This holistic approach ensures students gain both in-depth research experience and practical, collaborative skills in healthcare technology development.

Learning Outcomes:

- **Multi- and Interdisciplinary Collaboration Skills:** Enhancing ability to collaborate effectively with individuals from different academic backgrounds to address complex healthcare challenges
- **Knowledge about Technology Design & Implementation Process:** Developing skills and knowledge about the design, implementation, and testing of innovative healthcare technologies
- **Research Methodology and Communication:** Acquire competence in conducting rigorous literature reviews, applying the scientific method through experimentation and data analysis, and effectively communicating results in both oral and written forms
- **Project Management Experience (from ideation to implementation):** Learning how to plan, execute and manage R&D healthcare technology projects, with the focus on a timeline and available resources
- **Problem Identification and Innovative Solutions Skillsets:** Developing skills in identifying real-world healthcare challenges and creating innovative pathways to technological solutions

8.3 Introduction to Medicine for Healthcare Technology (mandatory for students with the STEM background)

Tailored for students with STEM backgrounds, the course provides a foundational understanding of medicine and key practices within the healthcare sector. The primary goal is to equip students with broad essential medical knowledge enabling them to communicate and collaborate with healthcare professionals to effectively address real-world healthcare challenges.

The curriculum introduces key fundamental concepts of medical sciences, such as physiology, pathology, diagnostic processes, treatment approaches, and patient care workflows of the Norwegian healthcare system. Through a combination of lectures, case studies, and interactive sessions with healthcare professionals, students gain a broad overview of the sector.

A unique highlight of this course is the opportunity to shadow a healthcare professional for one day at a collaborating hospital. This hands-on experience will expose them to daily challenges in the healthcare system, providing basic understanding of day-to-day operations and patient care processes. By engaging directly with professionals in action, students gain practical insights into the realities of medical care and identify areas where technological innovations can create meaningful improvements.

Learning Outcomes:

- **Medical Knowledge:** Acquire a fundamental understanding of human anatomy, physiology, and common medical conditions
- **Healthcare Practices:** Learn about diagnostics and treatment methods used in healthcare settings
- **Healthcare System Insight:** Gain insights into the organizational structure and workflow of the Norwegian healthcare system
- **Real-World Exposure:** Develop an appreciation for the challenges faced by healthcare professionals through direct observation and interactions
- **Innovative Perspectives:** Shift from a patient/visitor perspective to a proactive, problem-solving approach aimed at understanding and improving healthcare systems solutions

8.4 Healthcare Technology Implementation (mandatory for both study track)

This course equips students with the skills to design innovative healthcare solutions that are feasible and sustainable, with a strong emphasis on regulatory and economic considerations. Rather than focusing on technology development, the course challenges students to address healthcare problems by concentrating on the implementation process. Students will work in multidisciplinary teams to develop a strategic, actionable plan to bring their solutions into real-world practice. This includes creating a business plan, evaluating its technological feasibility, economic viability, and compliance with regulatory requirements.

Throughout the course, students will be exposed to a series of lectures by guest experts from the HealthTech industry and technology incubators, who will provide practical insights into the complex landscape of healthcare economics and regulatory requirements. The curriculum will include the following topics: the economic characteristics of health markets, market failures, health insurance dynamics, and the role and process of regulation and certification for healthcare technologies. This will allow students to imagine, describe, and evaluate the necessary steps for a chosen solution to be effectively developed into a commercial product and adopted in the healthcare system.

The teams (which may be the same as those formed during the Research and Development in Healthcare Technology course) will not only research and analyze their chosen challenges but will also create a mock startup. This process involves crafting a business plan that includes market analysis, competitive landscape evaluation, a clear value proposition, a financial model, and a strategic approach to addressing regulatory challenges.

The course concludes with a pitch presentation to a panel of "investors" composed of industry professionals, incubator representatives, and domain experts. This experience offers students direct feedback on the feasibility and viability of the proposed solution and implementation strategy, and gives them the opportunity to build a professional network.

Learning Outcomes:

- **Multi/Interdisciplinary Collaboration Skills:** Enhance skills in collaborating across disciplines to address complex healthcare challenges
- **Healthcare Market Knowledge:** Develop a foundational understanding of the economic characteristics of HealthTech markets
- **Regulatory Expertise:** Gain knowledge of the regulatory landscape and its impact on the implementation of healthcare technologies
- **Business Strategy Skills:** Learn to develop a strategic and financially viable business plan for a healthcare technology startup/company, with emphasis on practical and strategic components
- **Practical Implementation Skills:** Develop a practical understanding of how to bring new healthcare technologies to market, including the regulatory and economic perspective
- **Pitching and Communication Skills:** Improve skills in presenting and defending a healthcare technology project, developing communication and pitching capabilities

Advisory Board of the master's degree program in Healthcare Technology at ITS/UiO

- **Ulysse Teller Masao Côté-Allard, PhD:** Assoc. Prof. at the Department of Technology Systems, UiO; the coordinator of this new master's degree program
- **Ole Jakob Elle, PhD:** Head of the Medical Cybernetics and Image Processing section and Leader of the Medical Robotics, Visualization and Navigation research group at the Intervention Center of Oslo University Hospital; Prof. II at the Department of Informatics, UiO
- **Arian Ranjbar, PhD:** Head of Research, Medical Technology and E-Health and Leader of the Artificial Intelligence and Medical Informatics Group at Akershus University Hospital
- **Emilie Ranheim Skytøen, PhD:** neurosurgery resident at Oslo University Hospital
- **Ørjan G. Martinsen, PhD:** Prof. at the Department of Physics, UiO; Leader of the Oslo Bioimpedance and Medical Technology group
- **Joanna Sulkowska; PhD candidate:** Research Fellow at the Department of Technology Systems, UiO; radiology resident at Akershus University Hospital
- **Anne Catrine Trægde Martinsen, PhD:** Research Director at Sunnaas Rehabilitation Hospital
- **Steinar Halvorsen, PhD:** Prof. II and Head of Clinical and Experimental Cardiovascular Monitoring group at the Intervention Center of Oslo University Hospital
- **Egidijus Pelanis, PhD:** Medical Doctor and Special Advisor for Method Development and Industrial Collaboration at the Intervention Center of Oslo University Hospital