

For students in

**Renewable Energy Systems
and
Cybernetics and Autonomous
Systems**



UiO : Department of Technology Systems
University of Oslo



UiO : Department of Technology Systems University of Oslo

Dear student,

We are happy to have you with us at the Department of Technology Systems as a new master student. This brochure contains much of the information needed to be a master student at our department.

If you have any questions about your studies, please visit us at the administration on the ground floor at our Department, or send an e-mail to either

- Administrative head of studies, Kaja Mosserud-Haavardsholm, kajaem@its.uio.no
- Study consultant, Ida Elisabeth Rydning, idaery@its.uio.no
- Study consultant, Tuhta Ismailova, tuhtai@its.uio.no

Kind regards,

The study administration,
Department of Technology Systems





The Department of Technology Systems is located at Kjeller Research Park. The department participates in one of Norway's largest environments in research and development.



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BEING A STUDENT AT THE UNIVERSITY OF OSLO



ABOUT THE DEPARTMENT

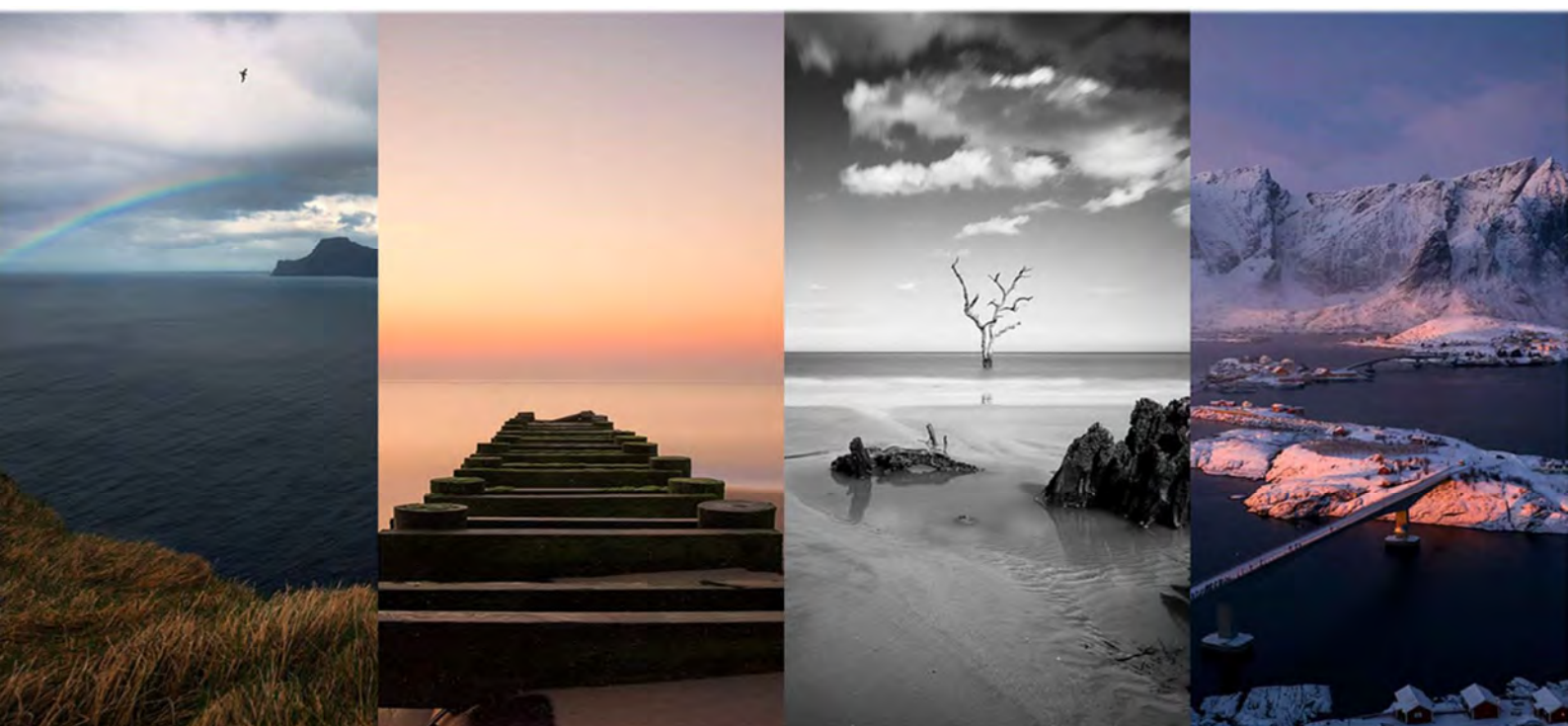
The Department of Technology Systems (ITS) is part of the Faculty of Mathematics and Natural Sciences (MN) and was established in Jan 1. 2017, following the merge of the former organization UNIK (The University Center in Kjeller) into UiO. The Department of Technology Systems is approximately 24 km from Oslo S, 35 km from Oslo Airport and 3 km from Lillestrøm city centre. ITS is located at the research park in Kjeller, due to close collaboration with the different research facilities and organizations here.

In addition to a technical administrative section, the Department is organised into two research sections:

- Section for Energy Systems
- Section for Autonomous Systems and Sensor Technologies

The Department has two master programmes in Cybernetics and autonomous systems and Renewable Energy Systems. For the time being, we have about 20 PhD researchers currently working at, or in cooperation with, ITS.

Our Department building is found at Gunnar Randers vei 19, 2007 Kjeller. The main entrance is in front of the building, facing both the Norwegian Defence Research Establishment (FFI) and the Institute for Energy Technology (IFE). Our building (will soon be) named after Pål Spilling, who was a great scientist working here, and in fact one of those who introduced the internet to both Norway and Europe in the 1970s.





Kim Mathiassen is an Associate Professor at the Department of Technology Systems. Here pictured with students taking his course: TEK4030 - Control of Manipulators and Mobile Robots.

GET YOUR STUDENT ID

One of the first things we recommend you to get in order, is getting your student ID card at Blindern campus.

To get your ID card:

Go to SiO Kundeservice in Kristian Ottesens hus at Blindern. The address is Problemveien 9 (SiOsenteret), which is on the back side of the book shop Akademika (see the last pages for a campus map). SiO Kundeservice is normally open from 10:00 – 15:00. Remember to bring an ID, such as your passport or bank card with photo ID.

Student number

All students at the University of Oslo have a UiO student number.

The number is shown on your student ID. You will also find your number in Studentweb, on top of the page My profile. The student number may be used at UiO, e.g. if you enquire at one of the faculty information centres with a question concerning your studies.

Your student number will not change even if you change your study programme at UiO.

UiO uses Outlook Webmail which is found at: mail.uio.no

If you search for “Webmail at UiO” on the UiO web pages, you will find a good help page. If you have trouble logging in to you e-mail or UiO-user, please contact the UiO helpdesk:

<https://www.uio.no/english/services/it/username-password/>



You can document that you are a student either with the digital student ID app on your mobile phone or with a semester receipt on paper and a student card.

The student card can give you access to buildings and rooms on the University, may allow you to obtain printouts and may be used as library card.

Student ID on your mobile phone

For a valid semester receipt in the student ID app you must:

1. have registered as a student in Studentweb and
2. have paid the semester fee.

The picture in the app is the same as you have on your student card. It will be sent automatically to the app. Read more in the section about student cards.

How to install the student ID app: <https://www.uio.no/english/studies/registrations/card/digital-student-id.html>

The student ID is valid

- until 31 January in the autumn semester
- until 31 August in the spring semester

Is the app not showing the current semester? Touch the three dots / gearwheel in the upper right in the app and select "Update" (requires internet access). In the digital student ID app, the semester receipt for autumn is visible from 1 July, and the semester receipt for spring is visible from 1 January.

The barcode in the top left corner indicates your student card number at UiO. If you don't have a student card, there will be no barcode in the top left corner.

Semester receipt on paper

- A semester receipt on paper is no longer necessary, but together with student card it is an alternative student ID.
- A paper semester receipt can be ordered in Studentweb. Go to 'More...' in the menu, choose 'Orders' and then 'Semester receipt'.
- A paper semester receipt will be sent to your semester address after some days. In July it will take longer.

Has your card been lost or stolen?

To renew your student card, book time and then go to SiO Customer Service Centre at Blindern.

SIGN UP FOR COURSES

- Sign up for courses in StudentWeb through the "active courses" tab or via your individual study plan.
- We advice you to wait for the actual registration until you have attended the welcome meeting at ITS in autumn.
- Students who received a conditional offer and have met the conditions will be granted study rights and can sign up for courses before the deadline.
- Check if the personal information registered on you is correct – including your address and other contact information.
- Make sure to register all your courses and pay your semester fee before September 1st! If you have any problems, contact us.



TEACHING AND MEETING AT ITS

In “normal” times, all lecturing is physically located at ITS, Kjeller, but several courses also publish all the lectures online at the course website.

Due to the COVID-19 situation, all lecturing has been offered only digitally.

UiO's digital teachings and meetings take place largely with **Zoom**, including parts of the program for the master's week. All UiO students have access to this program. It is therefore important that you understand how it works and set it up on your machine.

What is Zoom?

- UiO's preferred service for video meetings and remote lecturing
- Zoom works across all platforms, devices, and in browsers
- Guest accounts (non-UiO) can participate

Install the correct version of Zoom

- It is easy to install and log in to Zoom. Note! As a safety measure you should always use UiO Zoom, not the free version.
It is important that you log in with your UiO username and password.
- To install the correct version of Zoom

Click on this website for more information and help on how to use Zoom:

<https://www.uio.no/english/services/it/phone-chat-videoconf/zoom/student.html>



REGULATIONS

The Master's degree

The Master's degree consists of the Master's thesis and theoretical curriculum. The programmes offer theses with a credit value of 30 or 60 credits for the 2-year Master's degrees.

After the assessment of the written Master's thesis, a final Master's degree examination will be held, consisting of an oral presentation and examination of the thesis.

There should be at least 3 weeks from the submission of the thesis until the final oral examination, and normally no more than 6 weeks. When necessary, and in agreement with the student and the examiners, the Department can deviate from the rule that 3 weeks should pass from the submission of the thesis until the final examination.

Teaching and supervision

Teaching is offered in connection with courses, specialized syllabus and as individual academic supervision. You must find yourself a supervisor for your master's degree and thesis. Ask your academic staff for help. You can also ask the study administration for guidance to select a supervisor. **NB!** The teaching staff has a limited number of students to supervise. Therefore, we suggest that you quickly start the process on both theme and direction for your thesis, at least during the first semester. **Remember, the educational plan must be handed in to the department with a deadline of Dec. 1!**

Theoretical curriculum

The theoretical curriculum in the Master's degree consists of courses on 4- and 5000 level. This can include both courses and specialized syllabus, also from subject areas that are outside the natural sciences. Courses in method can be part of the curriculum.

The Master's thesis

The Master's thesis is an independent scientific project, completed under supervision.

A Master's thesis of 30 credits corresponds to one semester's work, and must be completed in 17 consecutive calendar weeks of full-time study in the autumn semester or 18 consecutive calendar weeks of full-time study in the spring semester, including the Easter holiday and public holidays.

A Master's thesis of 60 credits corresponds to one academic year of full-time study.

RENEWABLE ENERGY SYSTEMS

In everything from sun and wind to tidal waves and geothermal heat, we have energy that is renewable and widely available. This Master's programme aim to provide you with a solid foundation for developing the use of renewable energy systems in society. If you want a future job in the energy sector, this is the study programme for you.

Renewable energy systems expanding

Use of - and investments in - renewable energy is expanding. Since this will affect how energy is distributed, generated, controlled and regulated, renewable energy will cause major changes to society. The Master's Programme is constructed for meeting these changes, and the University of Oslo has a wide range of subjects and programmes ready to fulfill your need of a successful future career path.

Links to the industry and to research environments

The programme is administrated by The Department of Technology Systems (ITS), which is located at Kjeller. The Department operates in collaboration with the nearby research institutes: Norwegian Defence Research Establishment (FFI), Institute for Energy Technology (IFE), Norwegian Institute for Air Research (NILU), as well as Akershus EnergiPark - in fact, the majority of the lecturers at ITS are holding a position as a researcher at the various research institutes in the Kjeller area. The ongoing and extensive research in the energy sector being done at Kjeller means that we can offer you, as a student, relevant and up-to-date topics for your master thesis. The connections to business and industry are good, which gives a unique content and a realistic future perspective for our students.



PROGRAMME STRUCTURE

The Master's programme Renewable Energy Systems is a two-year full time study consisting of 120 ECTS credits.

The programme has the following structure:

- Mandatory courses, 40 ECTS credits
- Specialisation courses, 40 ECTS credits
- Elective courses, 20 ECTS credits
- Master's thesis, 30 ECTS credits

Course of study:

4. semester	Master's thesis		
3. semester	Specialisation course	Specialisation course	Elective course
2. semester	Specialisation course	<u>TEK5380 - Project course</u>	Elective course
1. semester	<u>TEK5300 – Renewable Energy: Science and Technology</u>	<u>TEK5350 - Energy markets and regulation</u>	<u>TEK5370 - Grid and smartgrid</u>
	10 ECTS credits	10 ECTS credits	10 ECTS credits

COURSES AND MASTER'S THESIS

All courses should normally be completed and passed before the last semester.

The mandatory courses consists of 30 ECTS credits foundation courses and a 10 ECTS credits project course. These are mandatory courses for all students on the programme:

- TEK5300 – Renewable Energy: Science and Technology
- TEK5350 – Energy Markets and Regulation
- TEK5370 – Grid, Smartgrid and IoT
- TEK5380 – Project in Renewable Energy

The specialisation courses consists of 30 ECTS credits and are primarily chosen from the courses listed below, but other relevant courses may be substituted in consultation with your supervisor:

- TEK5310 – Solar Cells
- TEK5330 – Solar Energy Systems
- TEK5340 – Energy systems analysis: Modelling, methods and scenarios
- TEK5320 – Battery Technology
- TEK5390 – Hydrogen Technology
- TEK5110 – Building Mobile and Wireless Networks
- TEK5530 – Measurable Security for the Internet of Things
- TEK5410 – Energy Markets and Regulation - Modelling and Analysis
- TEK5420 – Norway's Energy Transitions: Policy Directions and Challenges

The elective courses consists of 20 ECTS credits and are Master's courses chosen with your supervisor from your interests and the direction of your thesis.

The Master's thesis is an independent research work carried out under supervision. In addition to 90 ECTS credits of courses, you will write a thesis of 30 ECTS credits which is submitted on a fixed date in the last semester. The subject of the thesis is presented on a given date at the beginning of the semester and the deadline for submission is 17 weeks after this date. The Master's thesis must be written entirely in the programme's last semester, and is presented publicly by you at the end of the semester. Following the presentation, an oral examination with the sensors and supervisor follows.

Progression requirements

The standard study time for the master's programme is two years, or up to four years if you apply for part-time studies. If you use more time, it's important that you familiarise yourself with the policies for admission. Your admission to the programme may be cancelled if you do not register for the first semester of the study programme and you have absence without valid reason for more than one semester.

Recognition of Master's courses from former education

If you are admitted to the Master's Programme and you have completed Master's courses outside the University of Oslo, you may apply to have these courses recognised as part of your degree. Please contact the Department of Technology Systems for more information.

Diploma and degree

This programme leads to the following degree: Master of Science in Renewable Energy Systems

The diploma is issued when you have completed the courses that meet the requirements for a degree. Read more about diplomas here:

<https://www.uio.no/english/studies/examinations/diploma/>



CYBERNETICS AND AUTONOMOUS SYSTEMS

Master`s programme in Informatics: Robotics and Intelligent Systems

This programme option has its main focus on cybernetics, which is the science and technology of observing and describing dynamics and interacting in technical and biological processes.

Advanced computer technology is used to design complex technical systems for monitoring and controlling many types of processes in industry, energy production, environmental monitoring, transportation, aerospace, etc.

In relation to the programme option of robotics and artificial intelligent, this specialisation has its main focus of cybernetics applications that are central to the Department of Technology Systems at Kjeller and the Research detaparments at Kjeller. This is relevant for navigation and control of aircraft, ships, robots and autonomous submarine vehicles, and monitoring problems related to Norway's vast seas, energy production and environmental monitoring.

The specialisation is anchored in the research group Section for Autonomous Systems and Sensor Technologies (AUTOSENS) at the Department of Technology Systems at Kjeller. It would be natural to write a master thesis in cooperation with this group.

Programme structure

In the programme option Cybernetics and autonomous systems, you choose theoretical curriculum, your courses, in consultation with your supervisor. You can take Master's courses at the Department of Technology Systems, but also in the Department of Informatics, the Department of Physics or at the Department of Mathematics. You can construct your own course of study, or specialize towards research, industry or energy- and environmental monitoring.

You can choose between writing a long Master's thesis (60 ECTS) or a short Master's thesis (30 ECTS). In both cases, you and your supervisor will find relevant courses to support the thesis so that the total Master's study comes to 120 ECTS. This study option has three mandatory courses that you select from the list below. Two of these are strongly recommended for all, but can be replaced by other recommended courses if your thesis requires it. The third course you choose from the list of recommended courses below:

Strongly recommended courses

- TEK4050 – Stochastic systems
- TEK4040 – Mathematical Modelling of Dynamic Systems

Recommended courses

If you want to specialise within research, usage of robots, navigation and autonomous systems:

- TEK4030 – Control of Manipulators and Mobile Robots
- TEK5010 – Multi-Agent Systems
- TEK5020 – Pattern Recognition
- TEK5030 – Computer Vision
- TEK5040 – Deep Learning for Autonomous Systems
- TEK5600 – Visualization of Scientific Data

Courses from other departments:

- IN5520 – Digital Image Analysis
- IN4140 – Introduksjon til robotikk
- IN5490 – Advanced Topics in Artificial Intelligence for Intelligent Systems,
- IN4050 – Introduction to Artificial Intelligence and Machine Learning

If you want to immerse yourself in energy and environmental monitoring:

- TEK5050 – Imaging and Detection of Optical and Infrared Radiation
- TEK5160 – Radar Remote Sensing
- TEK5300 – Renewable Energy: Science and Technology
- TEK5340 – Energy systems analysis: Modelling, methods and scenarios
- TEK5330 – Solar Energy Systems

Courses from other departments:

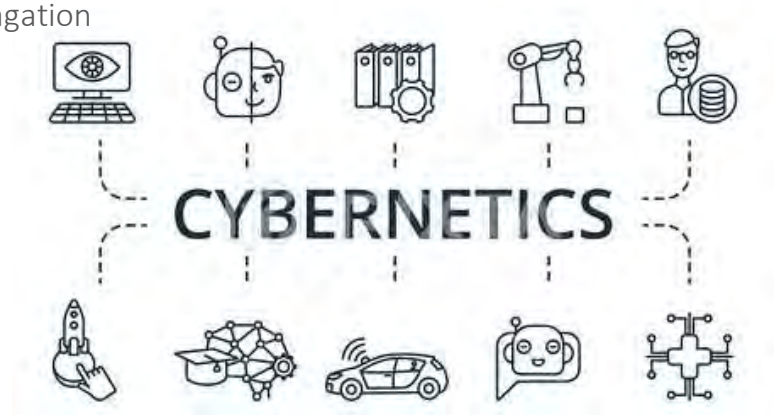
- MENA3200 – Energy Materials

If you want to immerse yourself in communication systems:

- TEK5120 – Modern Service Oriented Architecture (discontinued)
- TEK4110 – Software Defined Networking (discontinued)
- TEK5100 – Mobility in the Internet and ad-hoc Networks
- TEK5110 – Building Mobile and Wireless Networks
- TEK4120 – Mobile Communications
- TEK4100 – Signal Processing in Wireless Communication Systems
- TEK5130 – Satellittkommunikasjon
- TEK5140 – Antennas and Radiowave Propagation

Courses from other departments:

- IN5450 – Array Signal Processing
- INF4480 – Digital Signal Processing II
- IN4010 – Acoustic Imaging (continued)
- IN4230 – Nettverk



pixtastock.com – 74318255

YOUR STUDY PLAN AGREEMENT

FOR BOTH STUDY PROGRAMMES AT ITS

All master students at ITS must fill out and submit their study plan agreement. The agreement must be filled out in cooperation with your supervisor, and signed by both student and supervisor(s). The study plan agreement will be sent out to tall master students via e-mail. You can also pick up copies in the administration, first floor. The deadline for this is **1 December**.

UiO  The Faculty of Mathematics and Natural Sciences

Application for study plan agreement for the master programme in Renewable Energy

The is a study plan agreement between the student, the supervisor(s) and the program council on their several rights and obligations in connection with the plan for the master's program. The agreement consists of this form, alongside other potentially necessary attachments, which must be approved.

The form must be filled and signed after the admission to the master's program. The plan is filled by the student in collaboration with the supervisor(s), and will be submitted to the program council by the program coordinator for approval by December 1. of the first semester. For programs with admission in the spring semester, the form must be submitted by May 1. in the first semester.

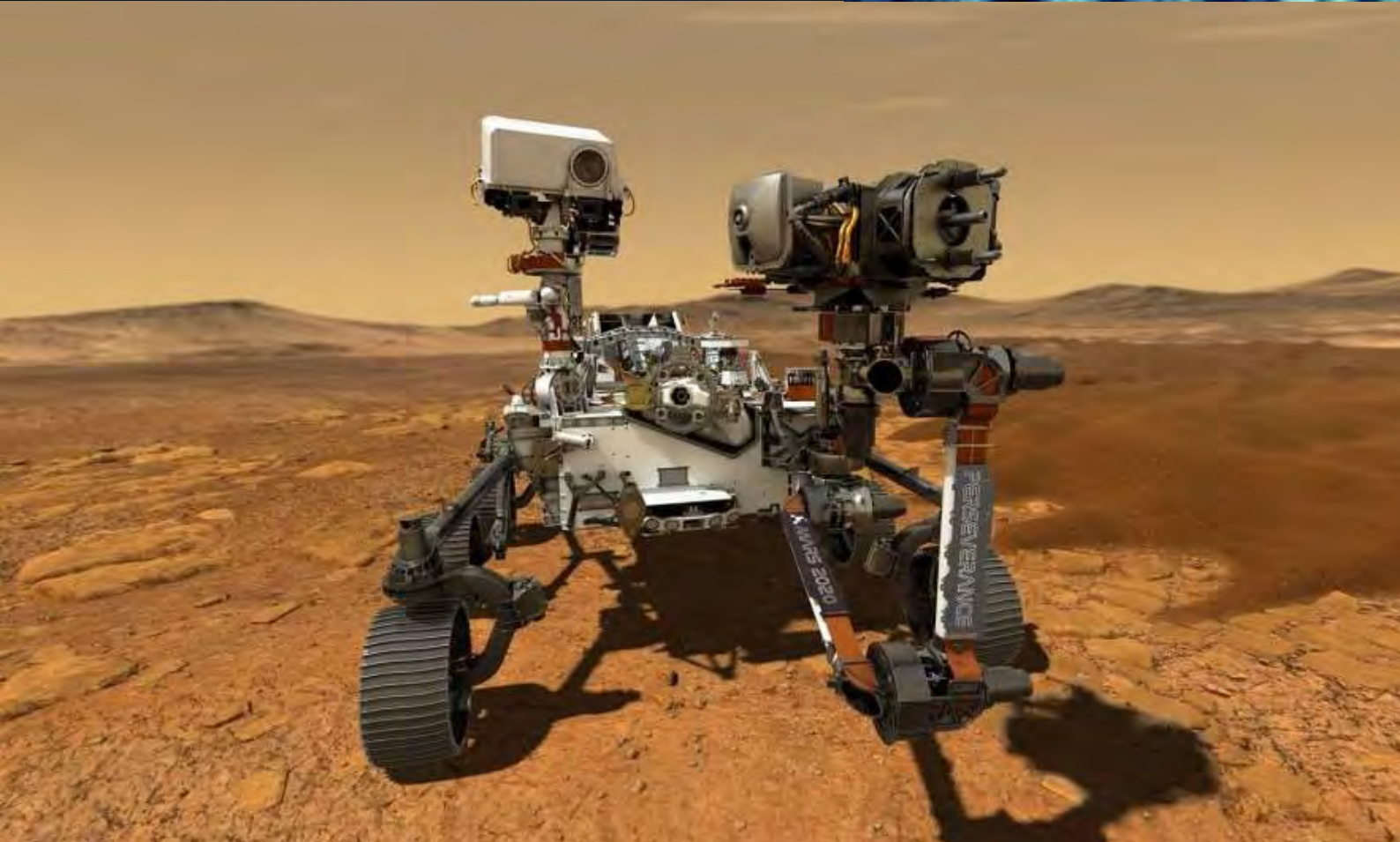
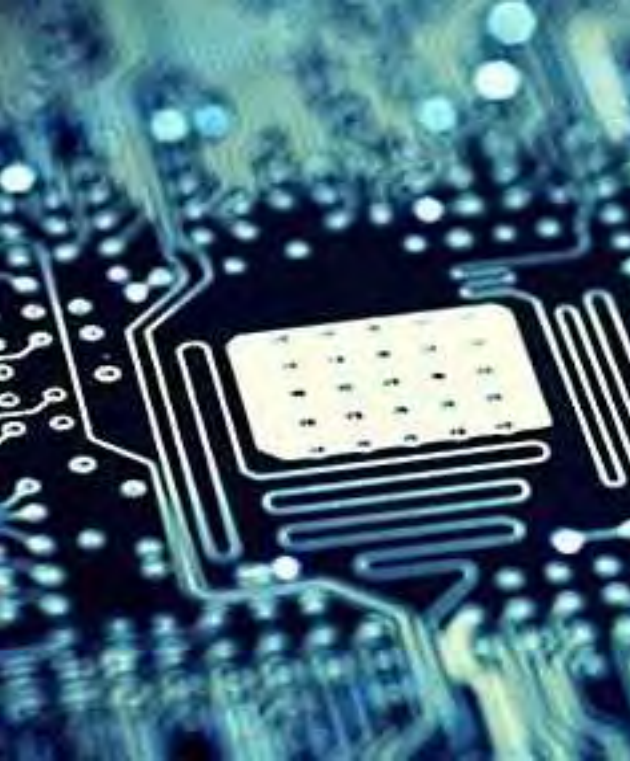
1. General information

Name:	Student ID (6 numbers)						
UiO e-mail:							
have admission to the study programme:				have admission to the study option:			

2. Supervisors and supervision (or contact person if you have not yet found a supervisor)

Hovedveileder har ansvar for at veiledningen fortsetter dersom han/hun har fravær for en periode. Studieadministrasjonen ved instituttet må holdes orientert.

Name of supervisor:	Office address, phone number, e-mail, position:	Function of the supervisor:	
		S = Main supervisor	I = Internal
		M = Co-supervisor	E = External
For supervisor(s) not employed at the Faculty of Mathematics and Natural Sciences, please clarify and present his/her qualifications here:			



PART-TIME STUDIES

The nominal study time for the master's programme is two years, and you can apply for part-time studies up to 50 % of normal progression. The long thesis (60 credits) can be worked on part time, but the short thesis (30 credits) must be done in one full semester. In practical terms, this means you can use up to 4 years on your master's if you write a long thesis, or up to 3,5 years if you write a short thesis.

If you plan on taking the programme as a part-time student, you fill out your study plan agreement with your supervisor as usual, just with the time schedule adjusted to your specific plan.

In order to keep your admission to the programme, you'll need to take at least 10 credits your first semester, and 30 credits by the end of your first year. If you have special needs you can apply for a reduced progression beyond the 50 %. Special needs can be, for example, long-term illness or large care tasks. Come talk to us in the study administration if this is relevant for you.

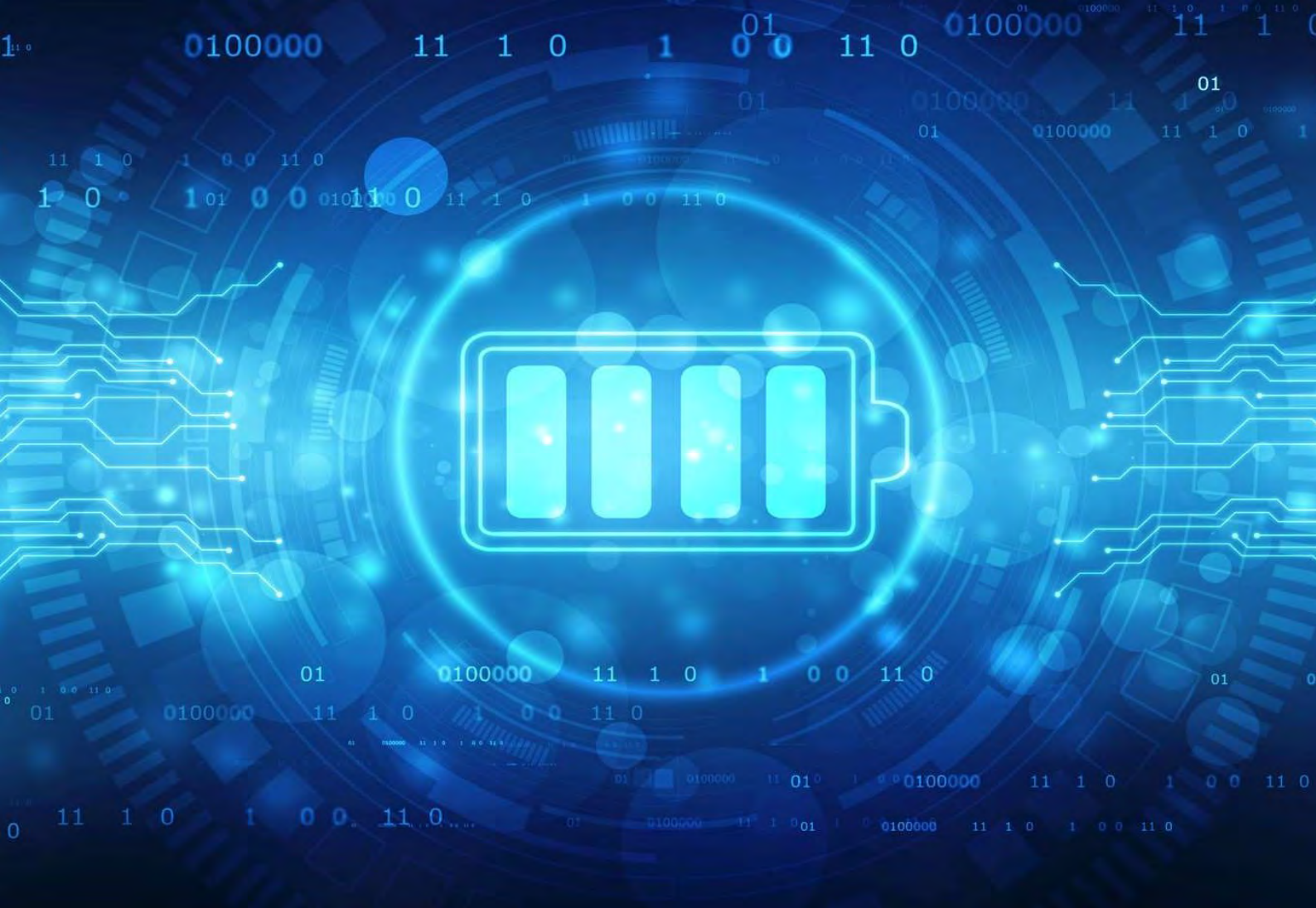


RECOGNITION OF EDUCATION

(GODKJENNING AV EKSTERN UTDANNING)

If you have education from other higher education institutions, you may apply for credit transfer and use these credits in your Master's degree. In order to do this, you'll need to do two things:

- 1) Formally apply for recognition through the Faculty of Natural Sciences:
<https://www.uio.no/english/studies/registrations/recognition/>
- 2) Add your courses to the plan when filling out your study plan agreement



IMPORTANT DEADLINES

1 september – deadline for

- signing up for examinations and lectures
- paying the semester fee
- applying for special examination arrangements
- applying for reduced progression

1 december – deadline for

- handing in your study plan agreement
- choosing a supervisor and theoretical curriculum

**I LOVE
DEADLINES.
I LOVE THE
WHOOSHING
SOUND THEY
MAKE AS
THEY GO BY.**

ADMINISTRATION CONTACT INFORMATION

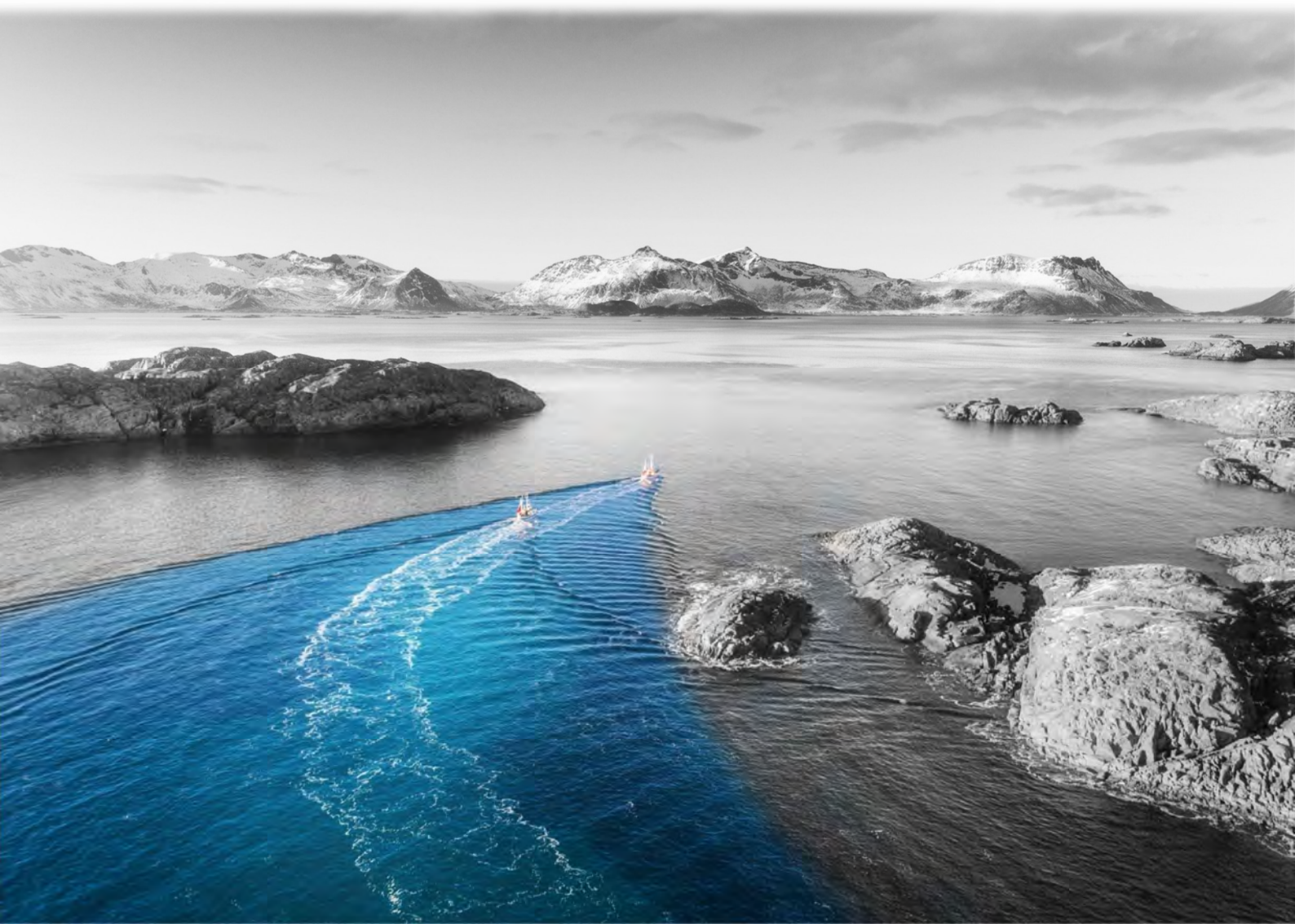
Study administration: Ida Elisabeth Rydning, i.e.rydning@its.uio.no,
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Human Resources: Marit Tronstad, marit.tronstad@its.uio.no

IT/Order of IT: Arild Hemstad, arild.hemstad@its.uio.no

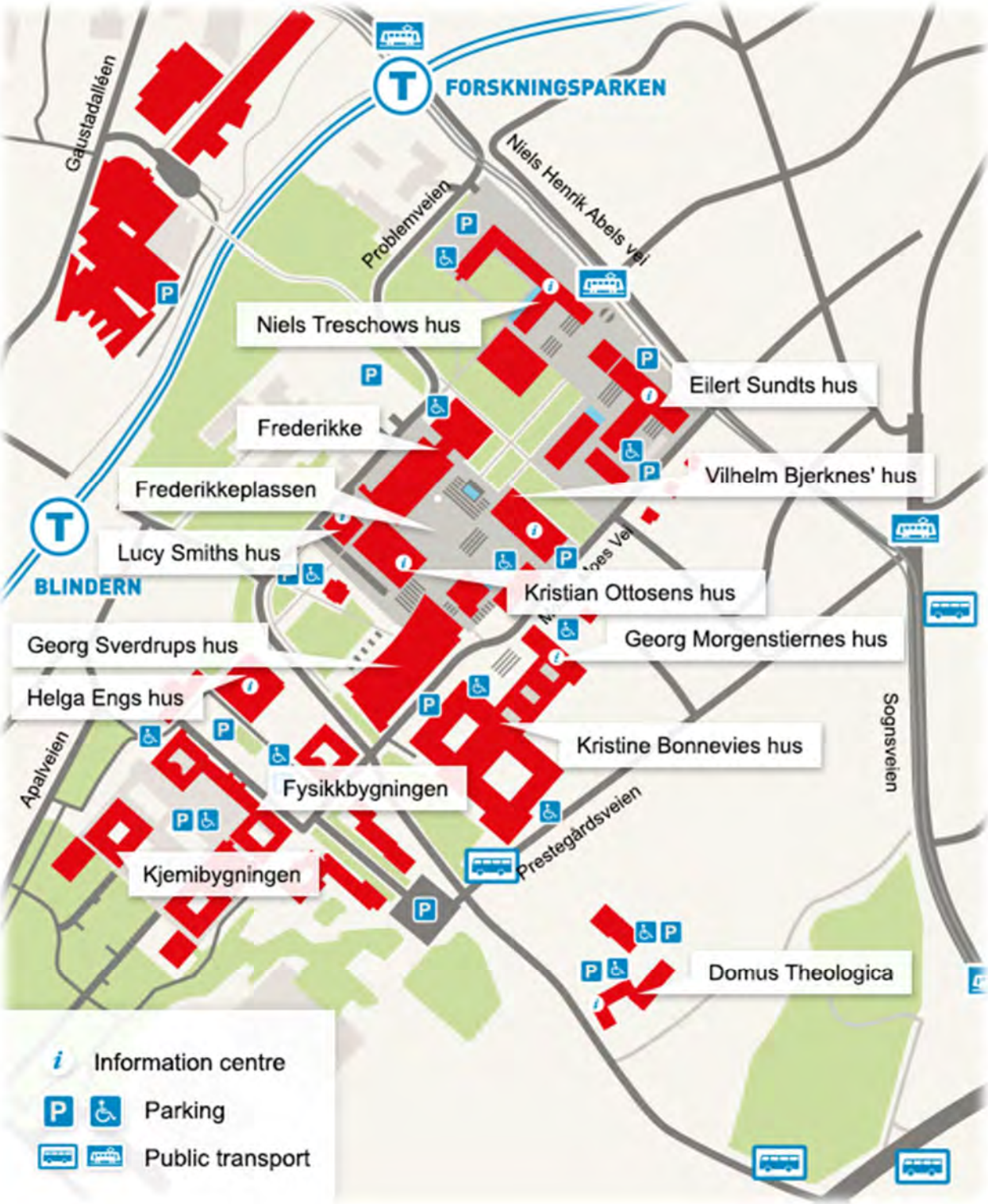
Webpages/Communication: Mette Johnsrud, mette.johnsrud@its.uio.no

To order things: Tuhta Ismailova, tuhta.ismailova@its.uio.no, Hellfrid O. Newman,
h.o.newman@its.uio.no



NOTES:

MAP OF CAMPUS BLINDERN



MAP TO THE DEPARTMENT OF TECHNOLOGY SYSTEMS, KJELLER

