1st semester (Autumn 2025)

DAT610
Wireless Communications

Master of Science in Computer Science

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Room: KE E-428

University of Stavanger

Course Information

Lectures

University of Stavanger

One 4-hour lesson per week

Time and Location
Thursdays 8:15-12:00 **Room:** KE D-123

The course covers the principles and challenges in designing protocols for wireless communications. It is mostly a theoretical course.

There will be questions (and Kahoot! Quiz at the end of the lectures).

Please interrupt me and make me questions!

Rules in Classroom

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- Be on time

- Do not eat during the lecture

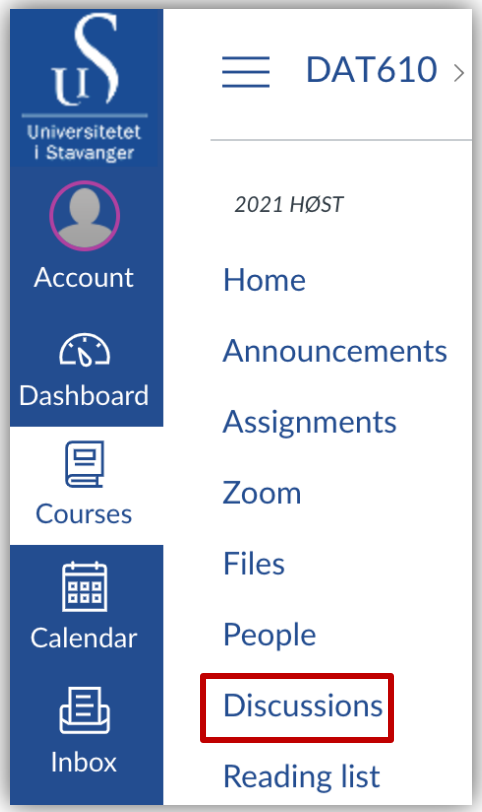
- Do not chat

- Make questions during the lecture

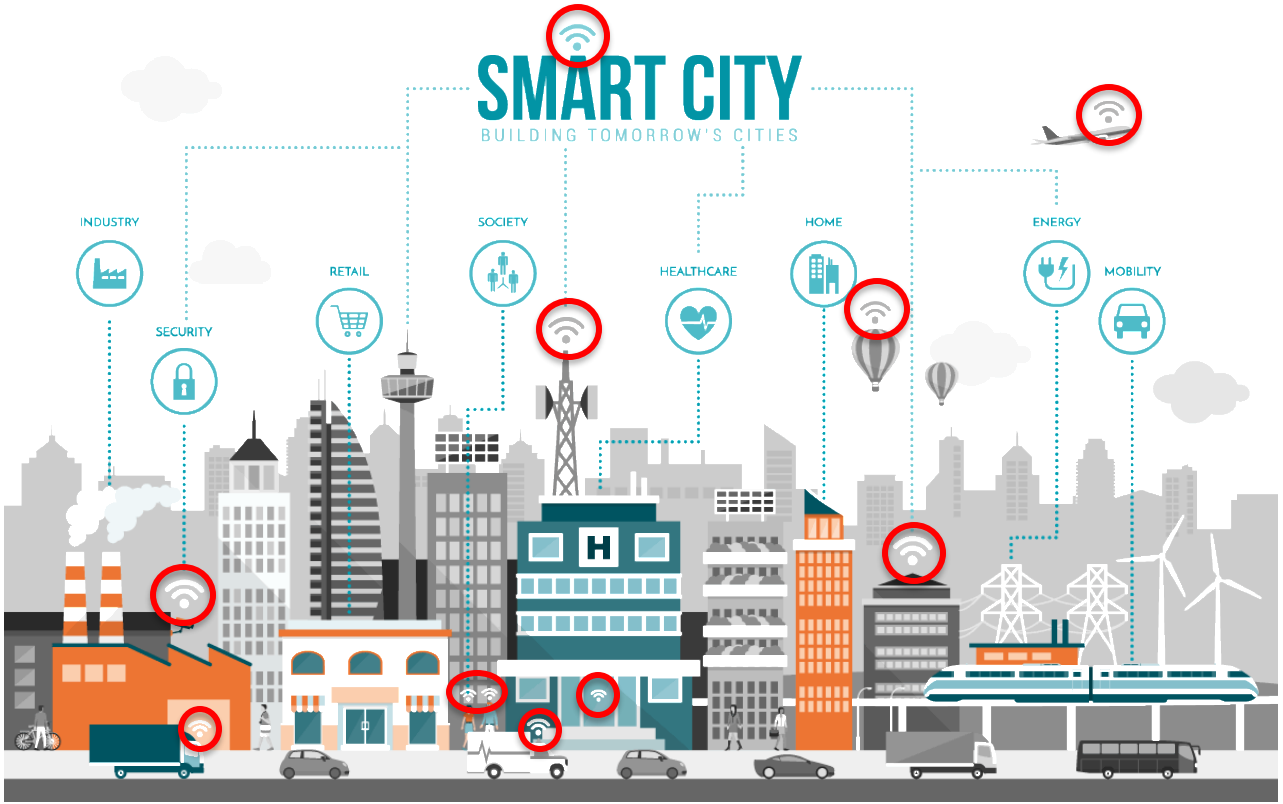
- Only ”personal” questions during the breaks

Send me questions via Discussions

- Valid for all the students
- Not personal questions
- Motivation
  - Other students can answer your questions (in a different way)
  - Other students can have your same doubts



Motivation



Source: https://www.arcweb.com/industries/smart-cities

Motivation

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https://www.stavanger.kommune.no/en/samfunnsutvikling/stavanger-smart-city/

triangulum

EU lighthouse project

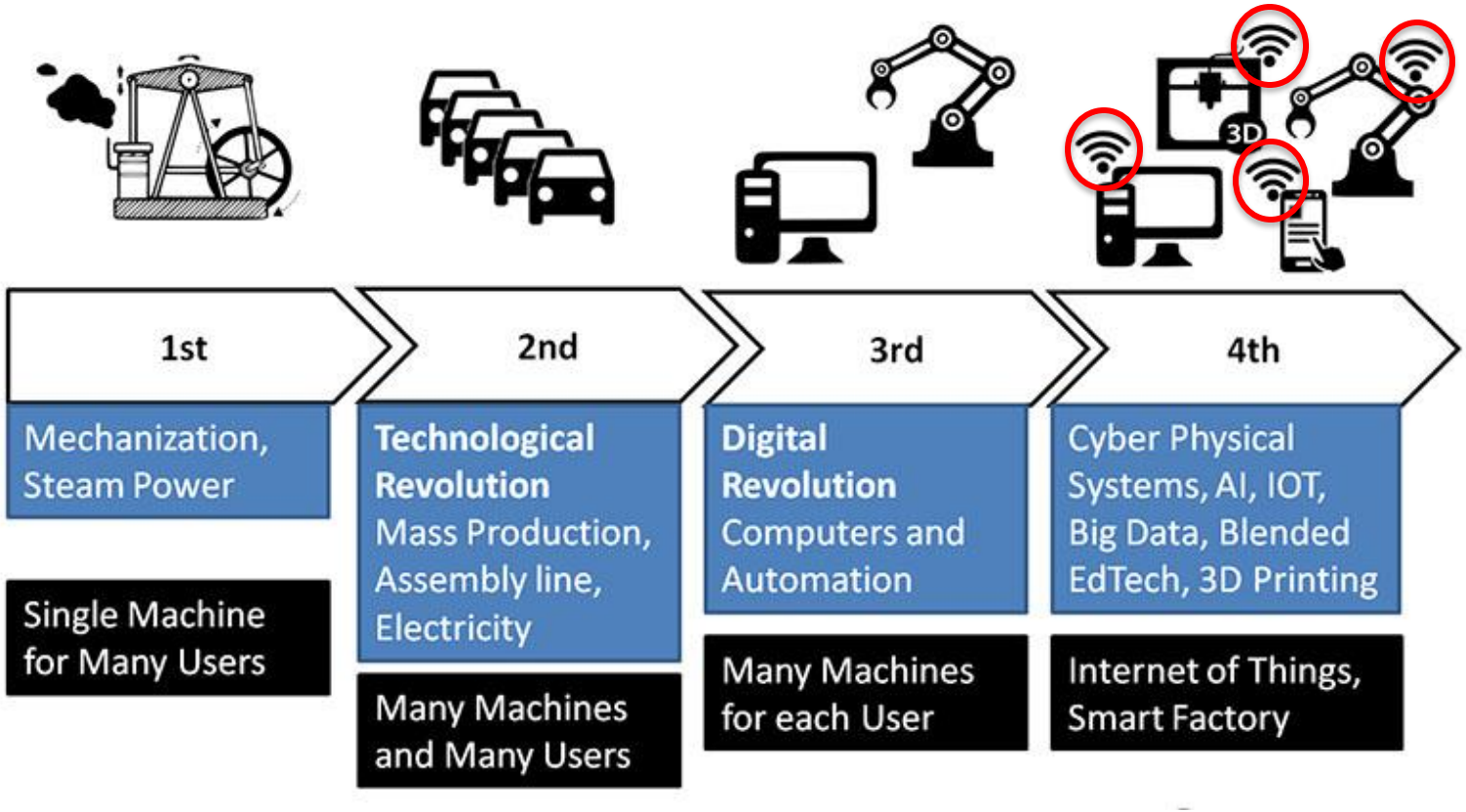
https://www.triangulum-project.eu/

NORDIC EDGE

EXPO 2026 – 5-6 May, Stavanger

https://www.nordicedgeexpo.org/

Motivation


3D
1st
2nd
3rd
4th
Mechanization, Steam Power
Single Machine for Many Users
Technological Revolution
Mass Production, Assembly line, Electricity
Many Machines and Many Users
Digital Revolution
Computers and Automation
Many Machines for each User
Cyber Physical Systems, AI, IOT, Big Data, Blended EdTech, 3D Printing
Internet of Things, Smart Factory

Lyse's 5G Testbed

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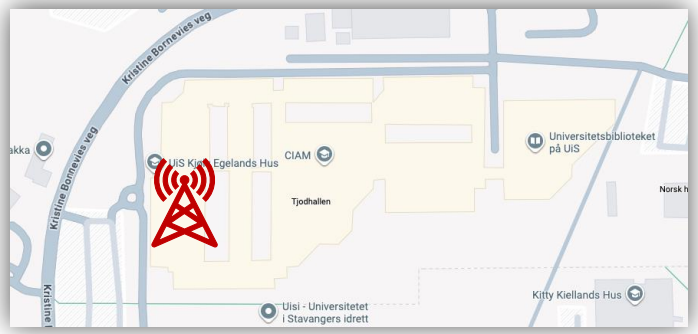

Public 5G

Private 5G:

- 5G Core and one Radio Unit (RU) at Innoasis
- One RU at UiS
- One at new hospital

5G Project at UiS

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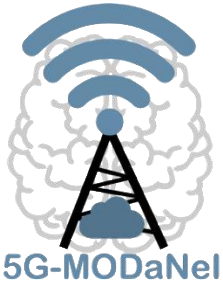
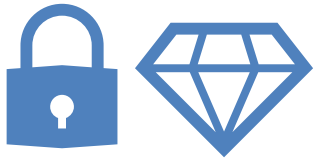
- 5G-MODaNeI



The Research Council of Norway

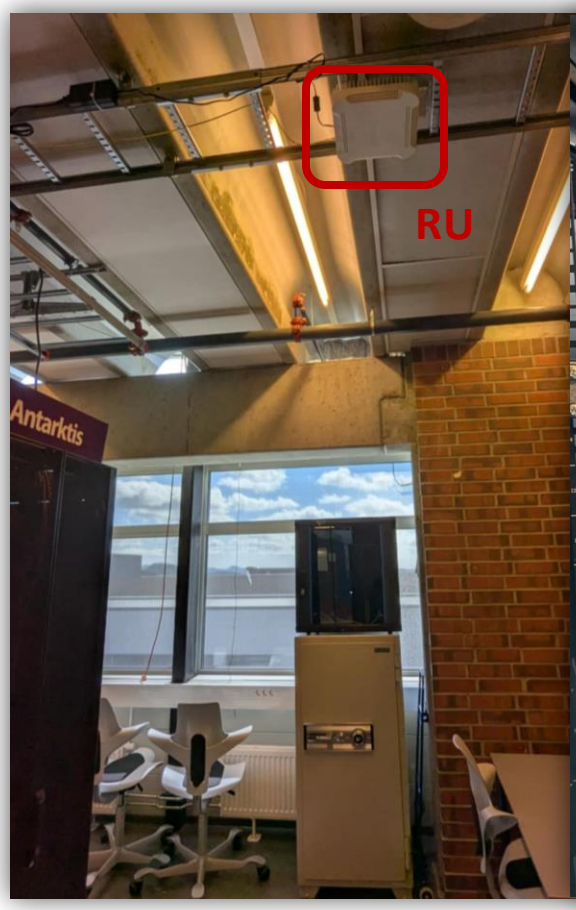
  - Funded by the Norwegian Research Council
  - 5G Multi-access Edge Computing

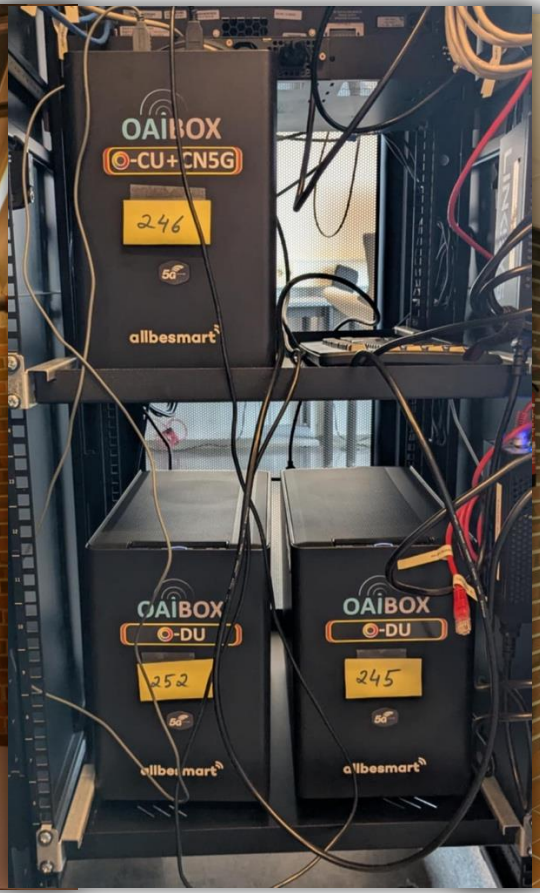
  - Security and dependability



  - AI-based orchestration of resources

5G-MODaNeI Testbeds: Private 5G





5G-MODaNeI Testbeds: Edge Computing

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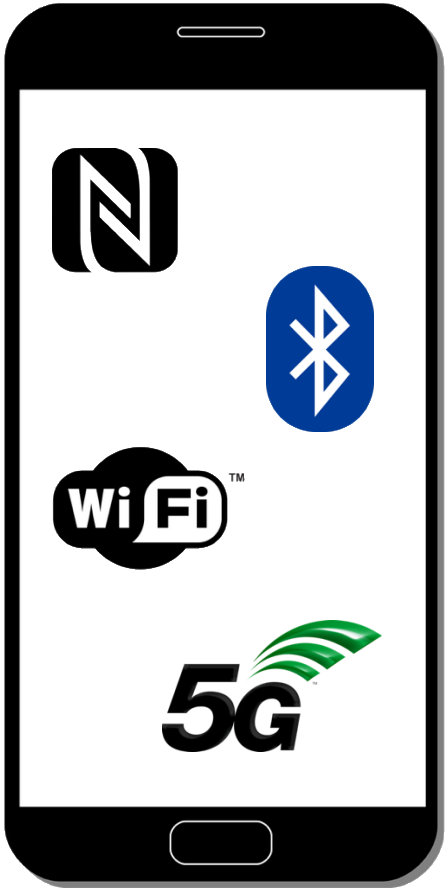
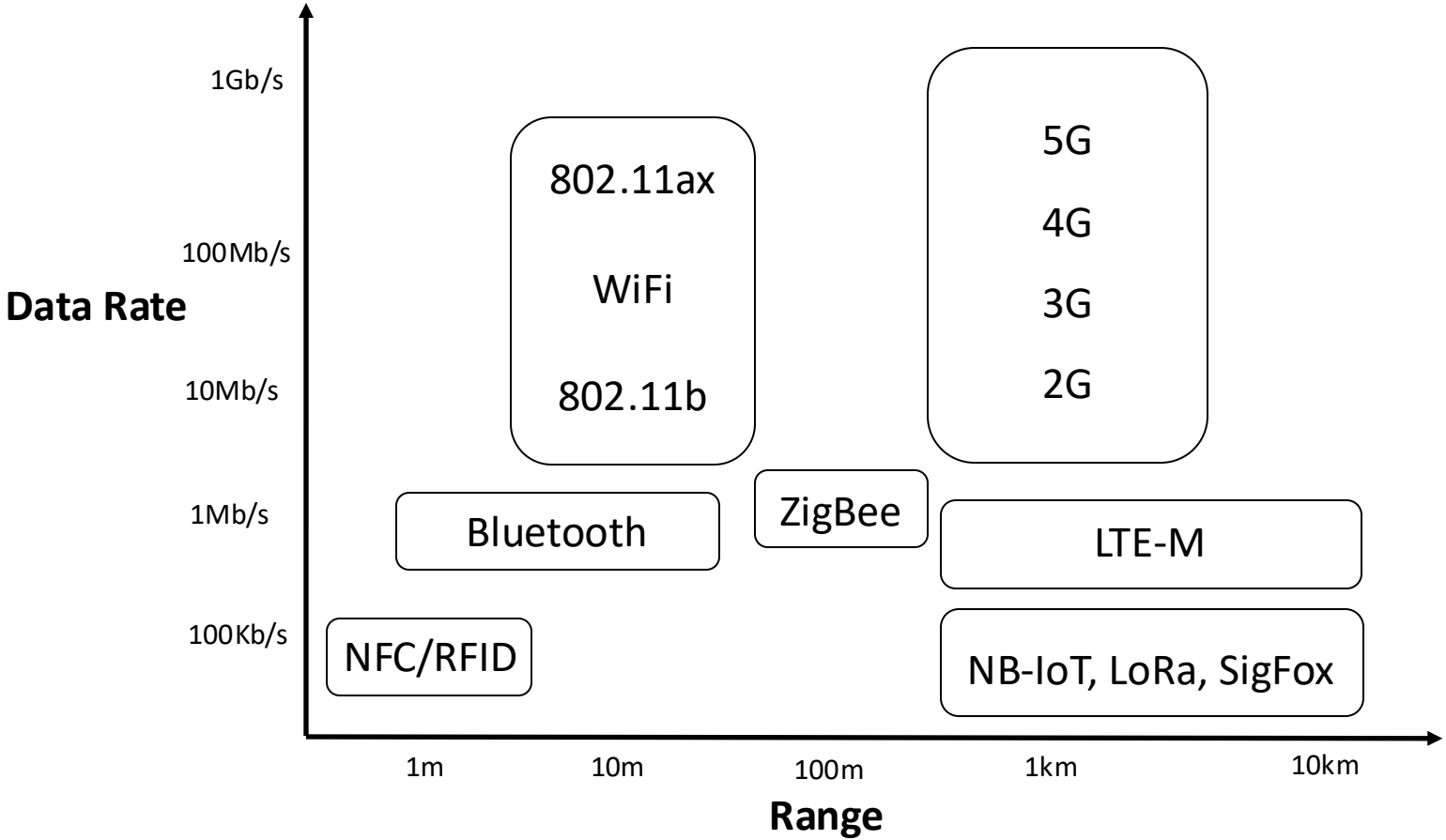
- 3 High-Performance NUCs
- 4 Servers
  - 2 +1 with GPUs on Openstack
  - 1 with GPUs
- Carrier-grade Switch

Wireless Communication



- Many wireless technologies:
  - Distance range
  - Data rate
  - Others (power consumption, mobility, …)
- Various generations

Course Content



Course Content

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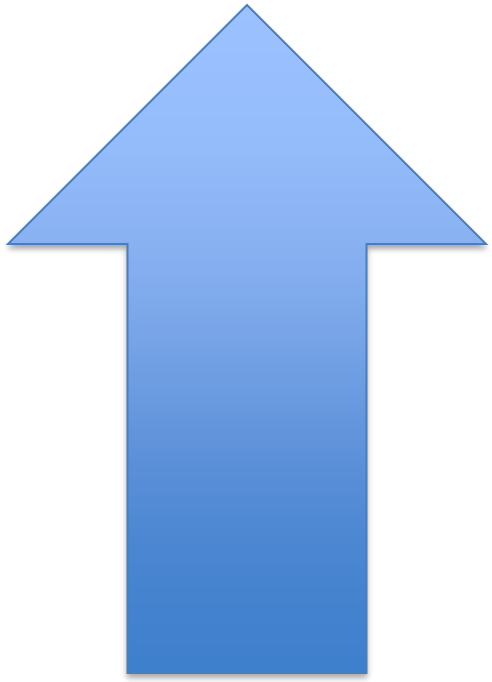
Open Systems Interconnection (OSI) Layers

- Application
- Presentation
- Session
- Transport
- Network
- Data Link
- Physical



Bottom-up approach!

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Course Schedule

Week 34:
August 21: Course Information – Technological Background

Week 35:
August 28: Physical Layer – *Assignment Tips*

Week 36:
September 4: Data Link Layer (MAC)

Week 37:
September 11: Data Link Layer (LLC) – Project Tips

Week 38:
September 18: Network Layer – Transport Layer [*Lecturer: Naeem Khademi*]

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Course Schedule

Week 39:
September 25: Cellular Networks

Week 40:
October 2: WPAN – WLAN – LPWAN
TBD: 1h Project Session

Week 41:
October 9: Intro to various (Wireless) Network Tools (?) + 3h Project Session

Week 42:
October 16: IIoT and its Applications [*Guest Lecture: Rosario G. Garroppo*]
TBD: 1h Project Session

Week 43:
October 23: Wireless Security [*Guest Lecture: ?*]
TBD: 1h Project Session

Course Schedule

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Week 44:

October 30: Project Session

Week 45:

November 6: Project Session – LAST CHANCE

The project sessions are with Student Assistant (?).

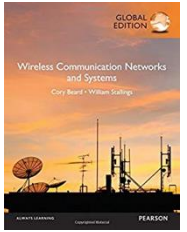
The project sessions are Q&A sessions with tips to overcome issues.

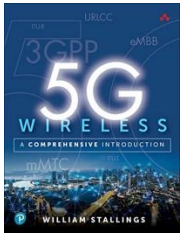
There is no teaching for the project, which is mainly self-study.

Note: the schedule is subject to changes!

Learning Material

- **Text Books (*optional*):**
  - ***Wireless Communication Networks and Systems,*** *Cory Beard and William Stallings*, ISBN 10: 1-292-10871-1, ISBN 13: 978-1-292-10871-1, Pearson Education Limited, 2016
  - ***5G wireless : a comprehensive introduction***, *William Stallings*, ISBN-10: 0136767141, ISBN-13: 9780137570423, Addison-Wesley Professional, 2021





- **Lecture Slides (*main material*):**
  - some are based on previous slides from Prof. Erdal Cayirci
  - available on Canvas after the lecture

canvas

- **Online material:**
  Research papers, standards, other…

Examination

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Assignments: pass/not pass

Project: 30%

Final Exam: 70%

Note: you need to pass all three of them!

You need to pass all the assignments to take the project and final exam.

Three Assignments

Final text before related topic lecture

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1. There will be **three individual assignments** that will have approved/not approved grade.
2. To pass **all three** assignments must be approved.
3. The assignments aim to help students to understand what is happening in: **physical layer**, **MAC sublayer**, and **LLC sublayer**.
4. We will provide **unfinished code** or **framework** of the simulations. Based on the simulation result, students are expected to **answer questions** and **analyze the results**.
5. We will use: **MATLAB** and **OMNET++** for the simulations. The **LaTeX** answer template will be available.

More suggestions later on.

Deadlines: September 12th,September 19th, and September 26th

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Group Project

Final text before related topic lecture

1. Project team of **two or three students** (deadline: September 25th)
2. The project topic will be on **5G**
3. The target is to explore how show how **different technologies** that are part of 5G affect the **performance** of the 5G network.
4. You chose (deadline: October 2nd):
    - 5G technology (mechanisms in one of the layer, …)
    - Performance metrics (data rate, delay, …)
    - Environment changes
    - Simulator
5. Free simulator but **MATLAB** (Simulink 5G toolbox) and **OMNET++ (simu5G)** are the advised.
6. Follow a **milestone roadmap** with non-mandatory deadlines to check if you are on track.
7. Write a **scientific report** by using an ad-hoc template. Your report must not be shorter than three pages and longer than five pages (including references).

More suggestions later on.

Deadline: November 13th

Motivations for Assignments and Project

- Self study
- Search and read technical material
- Technical writing/reporting

Important for other courses and thesis

- Apply in a real context (use case) what you have learnt in the lectures

Final target of the course

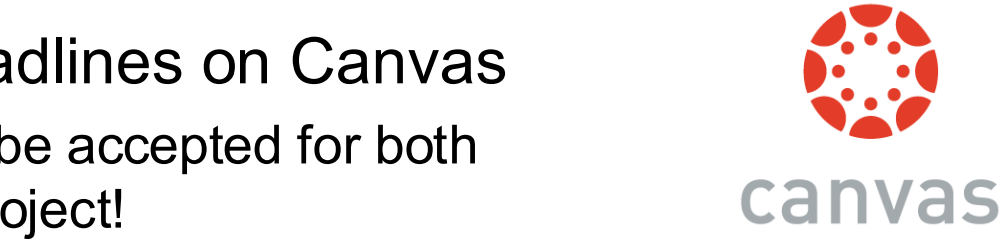
Plagiarism

- The mandatory activities in this course are subject to the general UiS guidelines about academic misconduct.

- What the university considers as cheating or attempted cheating:
  - Presenting others' work as one's own (*e.g.: delivering the activity made by another student, for example, rewritten through ChatGPT)*
  - Submitting practical work not produced by the student *(e.g.: writing a laboratory report using the data and figures obtained by another team)*
  - Submitting work not written by the student (*e.g.: copying and pasting the script generated by ChatGPT when asked to solve an exercise)*
  - … and much more, see https://www.uis.no/en/student-pages/cheating

Tips

- Take care of the deadlines on Canvas
  - No late delivery will be accepted for both Assignments and Project!

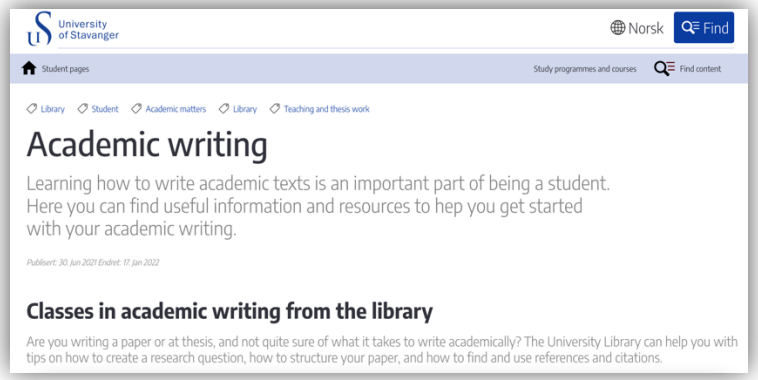


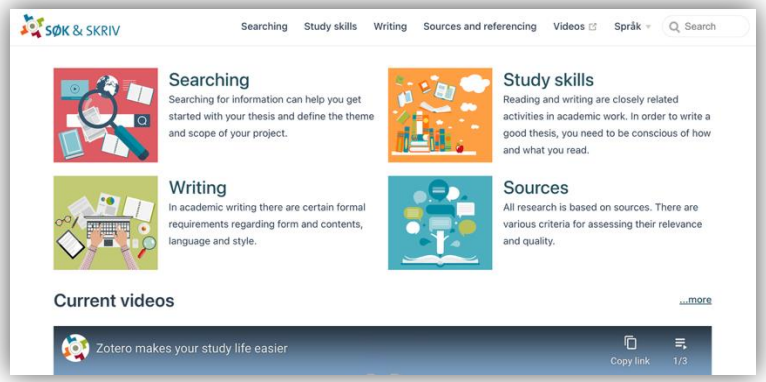
- Start early to work on the course project
  - Do not wait for the project sessions!

- If you have questions, ask ASAP
  - Do not wait until the deadlines are approaching

Advice

- UiS Library classes: *https://www.uis.no/en/library/classes*
- Academic writing class: https://www.uis.no/en/library/writing
- Useful resources: https://www.sokogskriv.no/en/





Remote Access to Online Material

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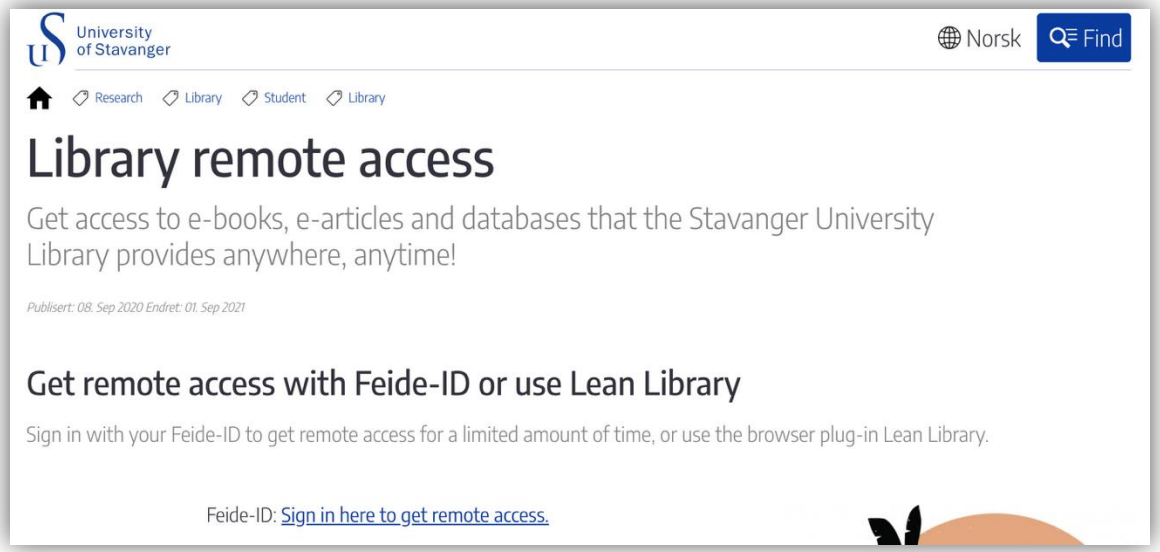
- Remote access to scientific papers via the library: https://www.uis.no/en/remote-access



Final Exam

- C.ca 8 open-ended questions (with subquestions) spread across the topics
- Direct questions (e.g.: What is A?)
- Note that the guest lectures are part of the course topics

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What do I expect from you?

Be interested to attend lectures

Study (by yourself)

Be active!

Pass the course (with good grades)!

What do you expect from me?

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Please provide feedback anytime!

(Do not wait for the course to end)

https://gianfranconencioni.weebly.com/dat610-feedback.html

canvas

Discussion section

Important to remember!

1. Be active, ask questions!
2. Learn!
3. Always check Canvas!