Teaching Portfolio

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1 Introduction

I am a PhD candidate in Cybersecurity at UiT The Arctic University of Norway, Department of Computer Science. I have submitted my thesis and am awaiting defence. My doctoral work focuses on lightweight cryptography, distributed trust enforcement, and secure IoT systems. Alongside my research, I have been involved in teaching and student-support activities across multiple courses, including **computer communications (INF-2300), computer security (INF-2310), advanced distributed systems (INF-3203), and privacy-preserving computing (INF-3315)**.

This portfolio is written for my application to the position of *Associate Professor in Cybersecurity* at *NTNU*. It documents how my teaching experience and pedagogical development meet the requirements for educational competence as specified in NTNU's guidelines and competence matrix.

Throughout my time at UiT, I have taken on responsibilities that extend beyond routine teaching duties. i.e., supervising lab groups, supporting diverse groups of students, examining master's theses, assisting in pedagogical coordination with course teams, and participating in internal teaching seminars. This teaching portfolio reflects on these experiences and highlights the values and principles that shape my approach to teaching cybersecurity and computing subjects.

I have attached my **Pedagogical CV** (Attachment 1), together with selected documentation, course materials, and supporting evidence of my teaching practice.

2 Educational Competence

2.1 Focus on Student Learning

My teaching centres on promoting understanding of topic and student autonomy through a combination of hands-on activities, iterative feedback, and clear learning outcome alignment. Across four courses, I have facilitated weekly lab sessions, guided project work, supervised assignments, and supported students with different academic backgrounds

Facilitating Understanding Through Active Learning

In **INF-2300 Computer Communications**, I supported students in implementing HTTP servers, REST APIs, and socket programming. These lab exercises required iterative debugging, and I consistently used "explain–demonstrate–guide" cycles to help students conceptualise underlying network principles before writing code. Example of a lab exercise is available at 2.

Supporting Diverse Student Groups

Across all the courses I taught, students' backgrounds ranged from experienced programmers to beginners. I adapted my communication and explanations to match these varying levels. For example, in **INF-2310 Computer Security**, some students were already familiar with cryptography, while others were encountering hashing or symmetric encryption for the first time. To accommodate this, I alternated between foundational explanations and more advanced problem-solving discussions through presentations.

2.2 Professional Development as a Teacher

My pedagogical development has been shaped by continuous reflection and exposure to diverse teaching environments.

Evolution Over Time

In my early semesters, my focus was on delivering content clearly and ensuring that students could follow the technical material. Coming from a different educational and cultural background, I initially needed time to understand the expectations, learning preferences, and communication styles typical within Norwegian higher education. With time and a continuous interaction period, I was able to observe how students engaged with instruction and asked questions.

Engagement With Student Feedback

I actively used informal feedback during lab hours and group discussions to evaluate what was working and what needed refinement.

Teaching Development Activities

I actively participated in **internal teaching seminars** within the department, where instructors reflected on pedagogical approaches, discussed challenges in delivery, and exchanged teaching materials. These sessions influenced how I approach constructive alignment, student engagement, and assessment strategies. Example email excerpt is shown in 3.

2.3 An Enquiry-Based Approach to Teaching

My teaching integrates similar approach as that to the **Feynman technique**. i.e., breaking complex ideas into simple, intuitive components and encouraging students to articulate concepts in their own words. As a cybersecurity researcher, I design learning activities that help students reason like security professionals rather than passively absorb material.

Research-Integrated Teaching

In computer security and distributed systems courses, I regularly posed questions such as:

> *If you were an adversary with these capabilities, how would you break this protocol?*

This enquiry-driven method helps students internalise threat modelling and adversarial reasoning, which are core competencies in cybersecurity.
In **INF-3203 Advanced Distributed Systems**, I used simplified models of consensus protocols (e.g., Paxos, Raft) to help students explore fault tolerance and consistency. By reducing these protocols to foundational principles, students learned to explain the mechanisms in their own

words, trying to implement Feynmann technique. In another module, a group of students selected a paper from a reputable security conference or journal and presented it to the class, followed by a structured discussion and Q&A session. This activity helped students engage with current research, practise academic communication, and develop the ability to evaluate security contributions in a scholarly manner.

2.4 A Collegial Attitude and Teaching Practice

Collaboration has been central to my teaching at UiT. I worked closely with course coordinators, fellow TAs, and lecturers to ensure teaching consistency, share resources, and contribute to the broader educational environment.

Collaboration With Course Teams

Examples include:

- Co-developing lab instructions and example solutions in networking and security courses.
- Coordinating grading approaches to ensure fairness across student groups.
- Contributing to course revisions, especially for the assignments in INF-2310 and INF-3315.

Contribution to Educational Quality

I served as an **examiner for three master's theses**, evaluating students' research, methodology, and scientific writing. This role strengthened my insight into expected learning outcomes at graduate level and improved my own teaching alignment. I have attached the relevant email (Attachment 4) from Wiseflow as supporting documentation for this claim.
I also organised **departmental PhD seminars**, where research ideas were presented, discussed, and critiqued. These activities demonstrate a commitment to the academic community and to fostering collaborative learning beyond the classroom. The attached Excel sheet (Attachment 5) contains an excerpt of the seminar planning.

3 Conclusion

My teaching philosophy is grounded in foundational clarity and the development of students' critical and independent thinking in cybersecurity contexts. Over my doctoral period, I have built a consistent pedagogical profile shaped by active teaching practice, collaboration with colleagues, and purposeful reflection. A central influence on my approach is the Feynman principle: the idea that deep understanding emerges when complex concepts are explained with simple, intuitive examples.

As I move toward an academic career, I aim to:

- integrate research-driven, enquiry-based teaching across cybersecurity courses,
- continue developing modern, student-centred pedagogical practices,
- contribute actively to educational quality and curriculum development at NTNU.

4 Attachments

1. **Pedagogical CV**
2. **INF-2300 Course Lab Exercise**
3. **Teaching Seminar**
4. **Master’s Thesis Examiner Proof**
5. **Seminar Planning**

Pedagogical CV

Name	Mohsin Khan
Position	PhD Research Fellow in Cybersecurity
Faculty	Faculty of Science and Technology
Department	Department of Computer Science, UiT The Arctic University of Norway
Telephone	(+47) 46750558
Email	Khann.mohsin@icloud.com
Period of employment at NTNU	Not applicable (applicant for Associate Professor position)

Education and pedagogical competence

2021–2025 (expected)	PhD in Cybersecurity, UiT The Arctic University of Norway. Research focused on lightweight cryptography, distributed trust enforcement, blockchain-based access control, and secure IoT systems. Competence directly relevant for teaching cybersecurity, cryptography, network security, threat analysis, and secure system design.
2021–2025	Pedagogical skills developed through supervised teaching practice. Responsible for delivering lectures, labs, and tutorial sessions in security-related courses at UiT (Computer Communications, Computer Security, Advanced Distributed Systems). Experience includes preparation of teaching materials, guiding lab groups, explaining theoretical concepts, and giving structured feedback to students. Participated in internal teaching seminars organized by TODOS.

Teaching experience

Fall 2022, Fall 2023, Fall 2024	Teaching Assistant (TA), Department of Computer Science, UiT
	INF-2300 Computer Communication (Bachelors, 10 ECTS): Ran exercise sessions and labs on computer networking fundamentals, including HTTP, DNS, and reliable communication. Guided students through three major mandatory assignments using a network simulator. Provided formative feedback, assisted in grading, and helped students connect protocol theory (Kurose & Ross) to practice.

Spring 2022, Spring 2023	Teaching Assistant(TA), Department of Computer Science, UiT
	INF-2310 Computer Security (Bachelors, 10 ECTS): Led weekly exercise groups on applied computer security. Supported and evaluated mandatory assignments on SSH key management, cryptographic file transfer, etc. Organized student presentations on real-world attacks (XSS, DDoS, etc.). Helped students understand both technical and human aspects of security.
Spring 2024, Spring 2025	Teaching Assistant(TA), Department of Computer Science, UiT
	INF-3203 Advanced Distributed Systems (Master-level). TA for an advanced course focused on research papers in distributed systems. Co-led paper discussion sessions supported students in planning and delivering technical presentations and supervised two main programming assignments. Helped students reason about consistency, fault tolerance, and performance evaluation in distributed systems.
Fall 2025	**Teaching Assistant, Department of Computer Science, UiT**
	INF-3315 Privacy-Preserving Computing (Master-level). TA for a course combining legal (GDPR) and technical privacy-preserving technologies. Supported lectures and group work, and supervised mandatory assignments on GDPR, privacy-preserving, oblivious transfer (OT), differential privacy. Helped students connect legal requirements to concrete technical designs.
2024–2025	**Examiner (Master's theses), Department of Computer Science, UiT**
	Master's examiner for three master's theses in computer security: Henrik Monsen (Spring 2024): Hauk Storjord (Spring 2025), and Jørgen Kristensen (Spring 2025). Responsibilities included independent assessment of the written thesis, evaluation of methodology and results, grading in collaboration with co-examiners from University of Oslo(Hein Meling) and NTNU (Jingyue li), and participation in oral examinations where applicable.

Pedagogical management

2023–2025 Coordination of cybersecurity lab instruction (UiT)	Assisted in coordinating lab sessions for Computer Security, Computer Communications, and Advanced Distributed Systems, including planning lab flow, distributing tasks among teaching assistants, and ensuring consistency across lab groups.
2023–2025 Contribution to course planning meetings	Participated in course-planning discussions with course leaders, providing input on lab scheduling, assignment design, and sequencing of learning activities to ensure alignment between theory and practical exercises.
2023–2024 Informal guidance of junior TAs and student groups	Provided technical and pedagogical guidance to new teaching assistants and supervised student lab groups, ensuring consistent delivery of course expectations.

This assignment does not count toward the final grade.

Reliable Transport Protocol

Published

In this assignment, you will explore algorithms for reliable data transfer as used by the transport layer in the Internet Protocol (IP) stack. You will implement one such algorithm and learn about its strengths and weaknesses compared to the other ones, as well as how they are vital for communication over an unreliable channel.

Background

We are used to thinking of network communication channels, like sockets, as a continuous stream of bytes, much like reading data from a file on disk. This is, however, only a convenient illusion. In reality, the Internet is a messy place. Data can be fragmented into smaller IP packets that are sent via different routes. Packets may be lost or corrupted in transit, and they might not even arrive in the order they were sent.

In general, there are three main problems that can arise when sending data over the network.

- **Packet loss**: a packet is irretrievably lost. This happens when a router's buffer is full. The router might then either drop incoming packets or delete some of the data it already has.
- **Latency**: a packet is delayed en route and arrives out of order. Data from the application layer, such as a file, is split into multiple packages that are sent separately. These might be routed differently through the network, and there is no guarantee that they arrive in the order that they were sent.
- **Corruption:** a packet is modified for some reason. This could happen because of interference, cosmic rays, etc.

Handling such irregularities is complicated and cumbersome for the applied programmer to deal with. Therefore, we mask these complexities in the transport layer, providing the application layer with the abstraction of a reliable communication channel.

Requirements (your task)

To complete this assignment, you must implement **one of the three main algorithms for reliable data transfer** that is covered by the course syllabus. These are:

- Go-Back-N,
- Alternating Bit, or
- Selective Repeat.

You are encouraged to implement either Go-Back-N (GBN) or Selective-Repeat. GBN is the default mode of TCP. Check out the **Reliable Data-Transfer Animation (http://www.ccs-labs.org/teaching/rn/animations/gbn_sr/)** to familiarize yourself even more with these algorithms.

To run and test your implementation, we provide a network simulator as described below. You are not to modify the application or network layers.

Precode

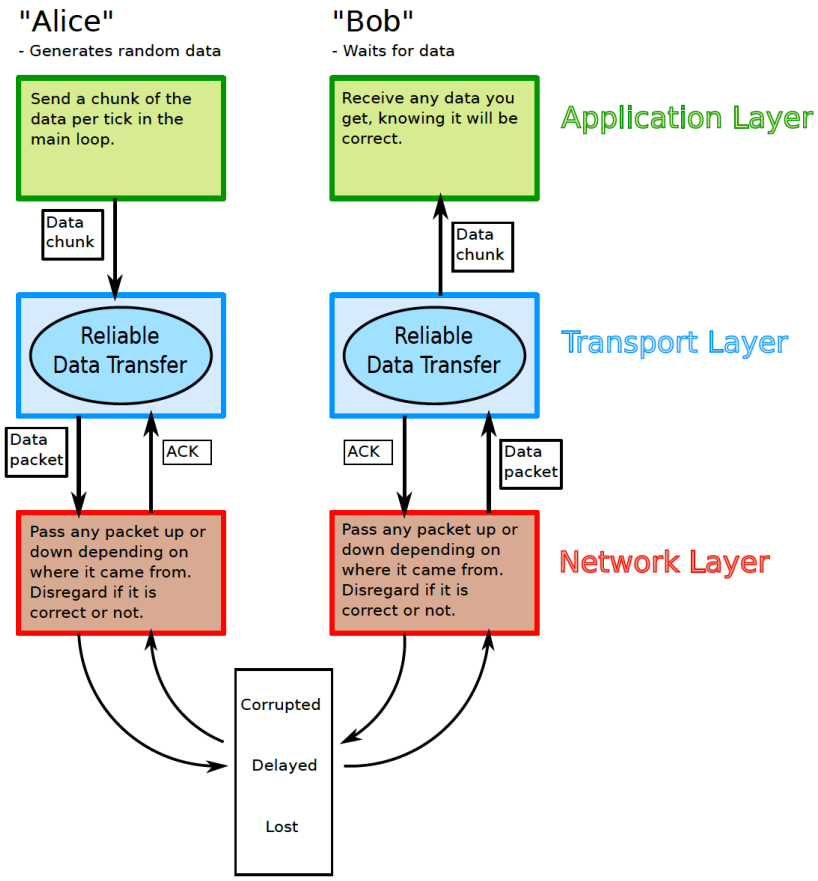
Precode download (https://uit.instructure.com/courses/26495/files/2064615?wrap=1) ⬇ **(https://uit.instructure.com/courses/26495/files/2064615/download?download_frd=1)**

The precode consists of a network simulator that uses classes to represent the various layers of the IP stack and the connections between them. Packets being sent across the simulated network channel might arbitrarily be dropped, changed, or re-reordered.

To pass this assignment, your transport implementation will need to handle all of these three situations.

The simulator will only change the `data` attribute in the *Packet class*. An ACK message will never be corrupted. Any attributes you choose to add to the *Packet class* will never be modified. The simulator only sends data one way. However, if it works one way, it should (in theory) work both ways.

The figure below shows the main data flow in the simulator.



In the figure, we can see a connection between two end-points: Alice and Bob. Alice will attempt to send data to Bob. The data passes through the transport layer on Alice's, through the network layer, and back up to the application layer on Bob's side. Using our simulator, the network layers will remove, change, and delay some of the packets. Any ACKs Bob sends back to Alice might also be delayed or lost.

Hand-In

Hand in your solution and the report by uploading it in a compressed file to Canvas. Your report should be in pdf format in the *doc* folder. Do not forget to update your README file.

Points	1
Submitting	a file upload

Due	For	Available from	Until
Nov 11, 2022 at 4pm	Everyone	Sep 30, 2022 at 11:59am	-

Teaching Assistant (TA) Day at the Faculty of Science and Technology

Maarten Beerepoot <maarten.beerepoot@uit.n... Tuesday, 28 February 2023 at 12:39

Welcome to the Teaching Assistant (TA) Day at the Faculty of Science and Technology!

This Outlook invitation has now been updated with the location.

The TA-day for Spring 2023 is a physical event on campus Tromsø on Wednesday March 1, 2023. The program consists of a plenary session and one or two rounds with elective modules after lunch. The program will to a large extent be adapted to the specific interests, needs and challenges of the registered participants.

Click here for more information, the program of previous TA-days and resources for TAs.

Program:

9:15-11:00 Plenary session: Introduction and case discussions (including a break), with David Coucheron & Maarten Beerepoot (Teorifagbygget 1.317)

11:15-12:15 Elective modules round 1

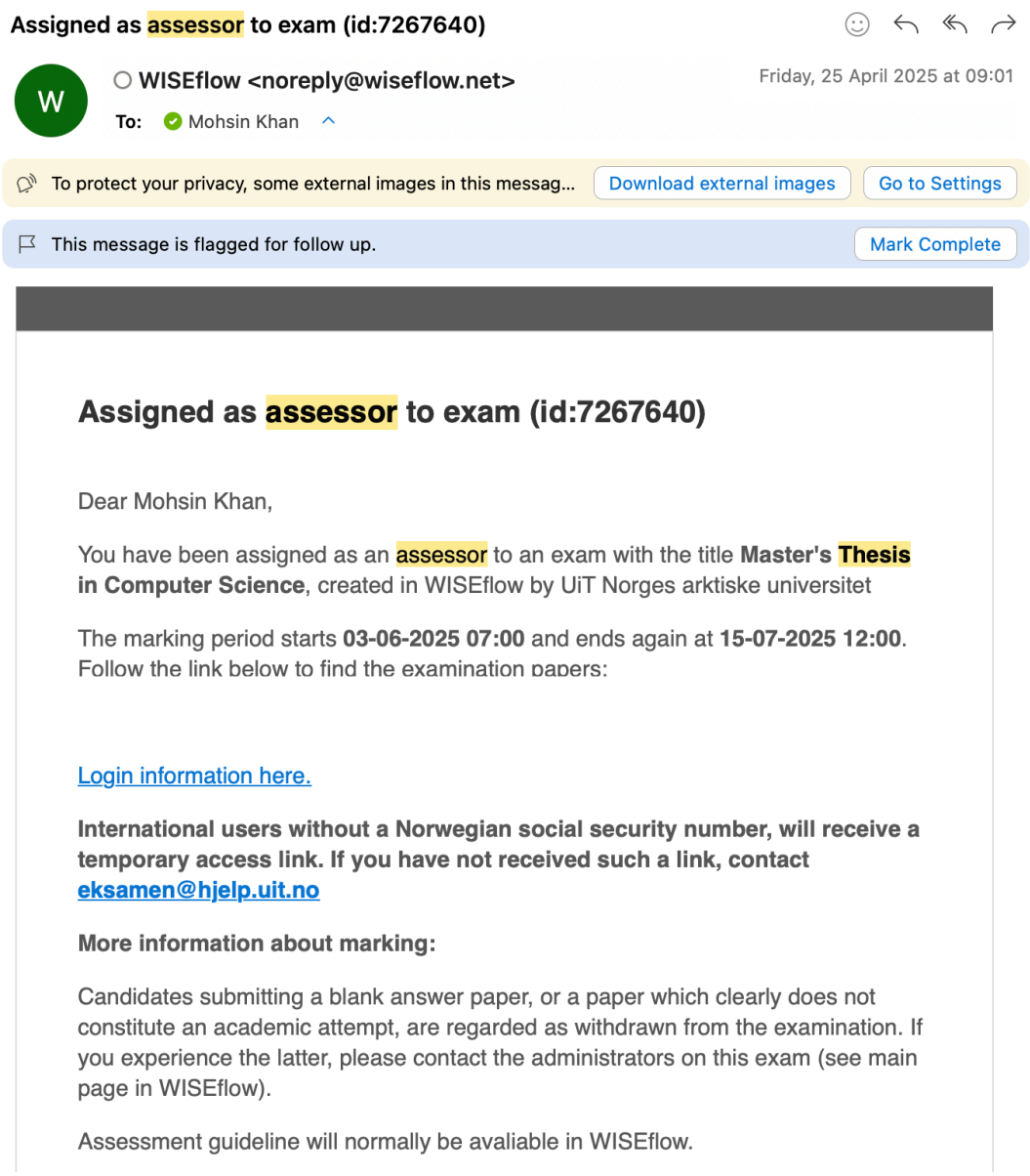
- Systematic development of your teaching: self-evaluation, student evaluation and peer review of teaching, with Maarten Beerepoot (Teorifagbygget 1.317)
- How to engage your students and increase learning with poll-based teaching, with David Coucheron (Teorifagbygget 1.417)

12:15-13:00 Lunch break

13:00-14:00 Elective modules round 2

- Challenging cases for TAs, with David Coucheron & Maarten Beerepoot (Teorifagbygget 1.317)
- Thinking classrooms, with Ida Friestad Pedersen & Hilja Huru (Teorifagbygget 1.417)

The TA-day is an offer for everyone with teaching duties as a teaching assistant at the Faculty of Science and Technology. The TA-day is designed especially for PhD students and is an offer in English supplementing Gruppelærerdagen and Result's PhD course. The TA-day is organised every Spring semester.



Assigned as assessor to exam (id:7267640)

W

WISEflow <noreply@wiseflow.net>

Friday, 25 April 2025 at 09:01

To: Mohsin Khan

To protect your privacy, some external images in this messag... Download external images Go to Settings

This message is flagged for follow up. Mark Complete

Assigned as assessor to exam (id:7267640)

Dear Mohsin Khan,

You have been assigned as an assessor to an exam with the title **Master's Thesis in Computer Science**, created in WISEflow by UiT Norges arktiske universitet

The marking period starts **03-06-2025 07:00** and ends again at **15-07-2025 12:00**. Follow the link below to find the examination papers:

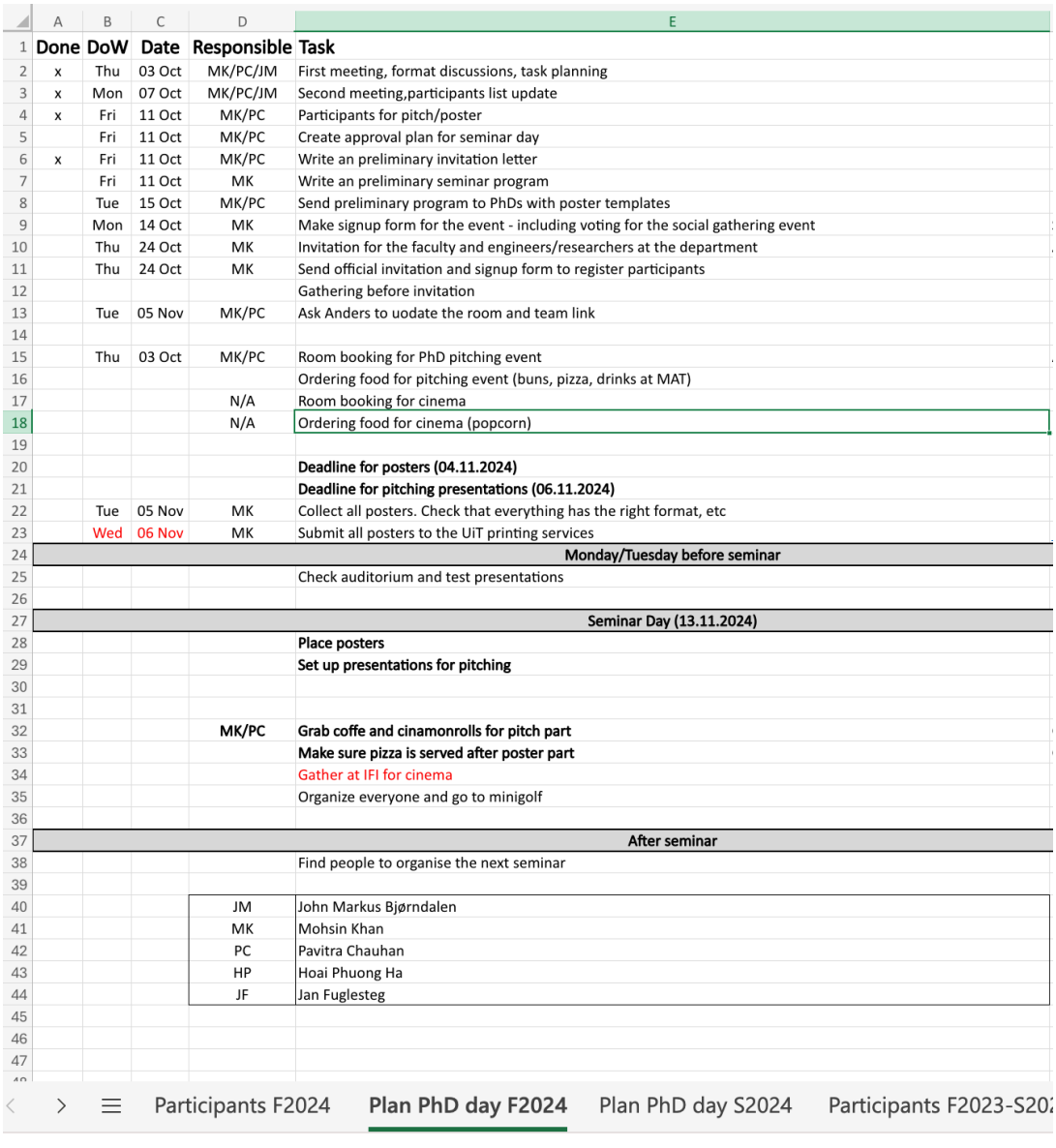
Login information here.

International users without a Norwegian social security number, will receive a temporary access link. If you have not received such a link, contact eksamen@hjelp.uit.no

More information about marking:

Candidates submitting a blank answer paper, or a paper which clearly does not constitute an academic attempt, are regarded as withdrawn from the examination. If you experience the latter, please contact the administrators on this exam (see main page in WISEflow).

Assessment guideline will normally be avaliable in WISEflow.



Done	DoW	Date	Responsible	Task
x	Thu	03 Oct	MK/PC/JM	First meeting, format discussions, task planning
x	Mon	07 Oct	MK/PC/JM	Second meeting,participants list update
x	Fri	11 Oct	MK/PC	Participants for pitch/poster
	Fri	11 Oct	MK/PC	Create approval plan for seminar day
x	Fri	11 Oct	MK/PC	Write an preliminary invitation letter
	Fri	11 Oct	MK	Write an preliminary seminar program
	Tue	15 Oct	MK/PC	Send preliminary program to PhDs with poster templates
	Mon	14 Oct	MK	Make signup form for the event - including voting for the social gathering event
	Thu	24 Oct	MK	Invitation for the faculty and engineers/researchers at the department
	Thu	24 Oct	MK	Send official invitation and signup form to register participants
				Gathering before invitation
	Tue	05 Nov	MK/PC	Ask Anders to uodate the room and team link
	Thu	03 Oct	MK/PC	Room booking for PhD pitching event
				Ordering food for pitching event (buns, pizza, drinks at MAT)
			N/A	Room booking for cinema
			N/A	Ordering food for cinema (popcorn)
				Deadline for posters (04.11.2024)
				Deadline for pitching presentations (06.11.2024)
	Tue	05 Nov	MK	Collect all posters. Check that everything has the right format, etc
	Wed	06 Nov	MK	Submit all posters to the UiT printing services
				Monday/Tuesday before seminar
				Check auditorium and test presentations
				Seminar Day (13.11.2024)
				Place posters
				Set up presentations for pitching
			MK/PC	**Grab coffe and cinamonrolls for pitch part**
				Make sure pizza is served after poster part
				Gather at IFI for cinema
				Organize everyone and go to minigolf
				After seminar
				Find people to organise the next seminar
			JM	John Markus Bjørndalen
			MK	Mohsin Khan
			PC	Pavitra Chauhan
			HP	Hoai Phuong Ha
			JF	Jan Fuglesteg

Participants F2024 | Plan PhD day F2024 | Plan PhD day S2024 | Participants F2023-S20