Aalto University
School of Electrical
Engineering

Project Work
ELEC- E8004 (10 cr)

Kick-off Lecture

Tomasz Kucner, Craig Carlson, Lauri Palva & Vesa Vuorinen
9.1.2024

Outline

Course general info

- **Personnel and contact info**
- **Timeline & Lecture schedule**
- **Learning objectives**

Project topics and groups

Business case

Support from communication teachers

Grading

Final Gala

2023 Feedback (optional)

Q&A

General info

Teachers in charge: Tomasz Kucner, Craig Carlson, Lauri Palva, Vesa Vuorinen & Rinna Toikka & Co. (Language center, communication competences)

- Please send all course related questions, inquires etc. to:

project-work@aalto.fi

- The individual e-mails are:

Firstname.Surname@aalto.fi

Visiting experts:

- Jochen Kruska, EKE-Electronics, Project management
- Harri Suurjärvi, CE-marking and standards
- Mikko J Salminen, Spinverse, Project consultation
- Tuomo Ritari, Finnish Patent and Registration Office (PRH)

General info

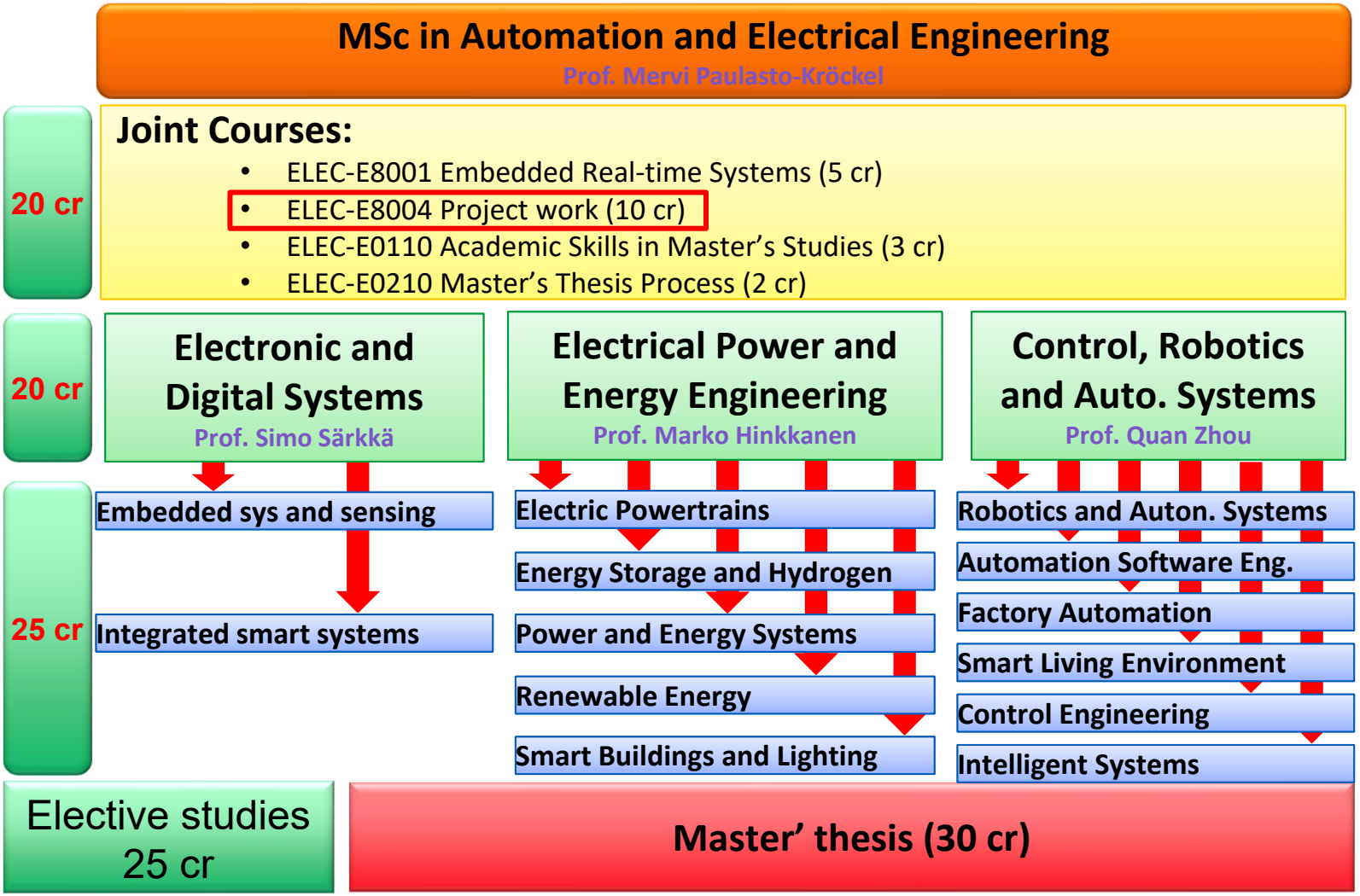
Lectures

- Held in TU1 Saab Auditorium - 1017, Maarintie 8 on Tuesdays @ 12:15-14:00 (default)
- Lecture schedule (in MyCourses)

➢ 9.1.2024 12:15-14:00 Kick-off
➢ 23.1.2024 12:15-14:00 Project planning lecture
➢ 30.1.2024 12:15-14:00 Project management/planning lecture
➢ 6.2.2024 12:15-14:00 Project management/planning lecture
➢ 13.2.2024 12:15-14:00 Standardization
➢ 27.2.2024 12:15-14:00 Business case exercise kick-off
➢ 29.2.2024 12:15-14:00 Product concept
➢ 5.3.2024 12:15-14:00 Intellectual property rights (online via Zoom)

NOT YET REGISTERED IN SISU?

DO IT TODAY!


MSc in Automation and Electrical Engineering
Prof. Mervi Paulasto-Kröckel
20 cr
Joint Courses:
ELEC-E8001 Embedded Real-time Systems (5 cr)
ELEC-E8004 Project work (10 cr)
ELEC-E0110 Academic Skills in Master's Studies (3 cr)
ELEC-E0210 Master's Thesis Process (2 cr)
20 cr
Electronic and Digital Systems
Prof. Simo Särkkä
Electrical Power and Energy Engineering
Prof. Marko Hinkkanen
Control, Robotics and Auto. Systems
Prof. Quan Zhou
25 cr
Embedded sys and sensing
Integrated smart systems
Electric Powertrains
Energy Storage and Hydrogen
Power and Energy Systems
Renewable Energy
Smart Buildings and Lighting
Robotics and Auton. Systems
Automation Software Eng.
Factory Automation
Smart Living Environment
Control Engineering
Intelligent Systems
Elective studies 25 cr
Master' thesis (30 cr)

(Generic) Learning Objectives/Outcomes

After completing the course, the student:

- knows the benefits of project planning,
- is able to create a project plan,
- has an experience of working in a group,
- understands quality requirements of in-project deliverables,
- is able to communicate within project team and with external stakeholders
- is able to describe typical phases of a project,
- is able to use common project management tools and methods, and
- has an experience of completing a real project.

NB: Every topic has specific “technical” learning objectives

- has acquired a deep new knowledge on the project topic

Terminology

Project topic

- project in which you are working during the course

Project group

- group of students (4±1) in Project topic

Instructor

- teacher/researcher/professor guiding you in your topic

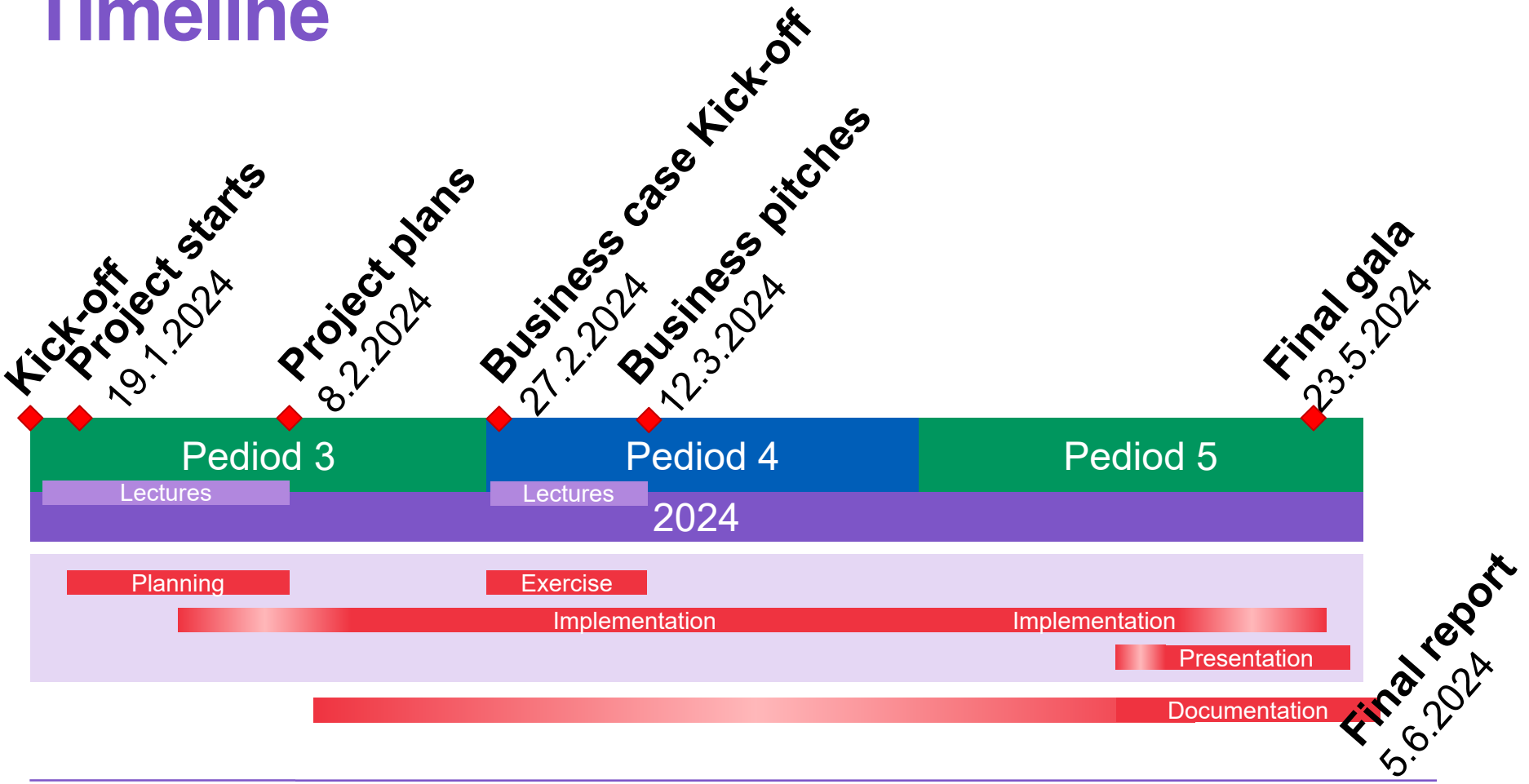
Project plan

- the formal plan of the objectives and execution of the project

Business case document

- ”light version” of business plan, includes product concepts

Timeline


Kick-off
Project starts
19.1.2024
Project plans
8.2.2024
Business case Kick-off
27.2.2024
Business pitches
12.3.2024
Final gala
23.5.2024
Pediod 3
Pediod 4
Pediod 5
Lectures
Lectures
2024
Planning
Exercise
Implementation
Implementation
Presentation
Documentation
Final report
5.6.2024

First events and milestones

9.1.2024	Kickoff Lecture
	Project topics have been revealed
15.1.2024@12:00	DL for the selection of your preferred (5) topics
	& motivation letter (in MyCourses)
19.1.2024	Project groups are revealed
23.1.2024	1st Lecture about project planning
	Meet the group & the instructor
30.1-13.2.2024	Lectures about project planning & management etc.
8.2.2024@23:59	DL to submit Project plans

... See MyCourses for more …

Project Topics

EEA Research Groups have provided 27 Project Topics

- 15 CRAS, 5 EDS & 7 EPEE
- The projects are designed for groups of ~4 students
- Each project has an official instructor (staff of department)
- Own project topics are not possible

Project topics are related to research activities of EEA dept.

- Your instructor helps you in project related matters
- Budget for required parts etc. is available

Which will be your Project topic?

Each offered Project topic

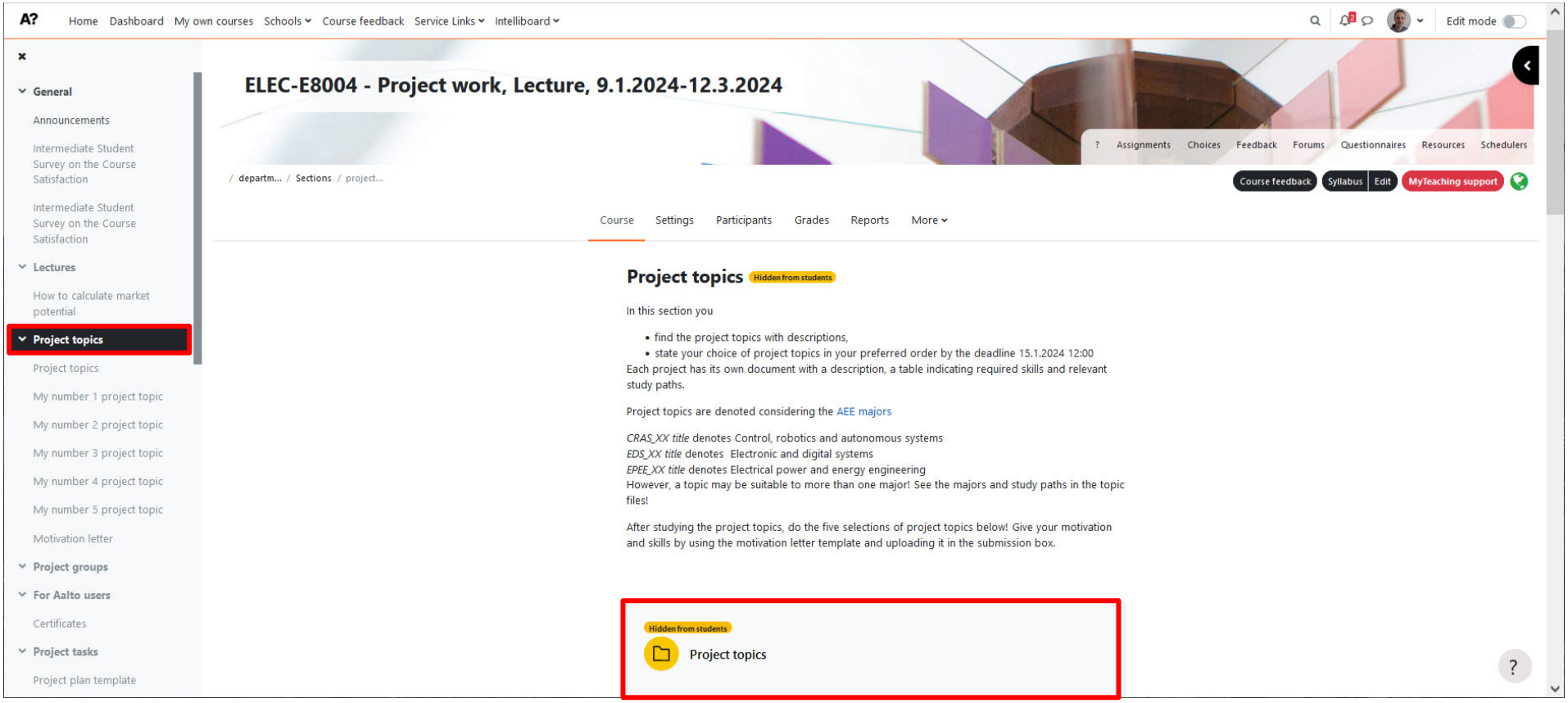
- is related to a certain Study path/ Research group,
- requires certain pre-knowledge and
- offers specific learning opportunities.

Our aim is to offer you a Project topic

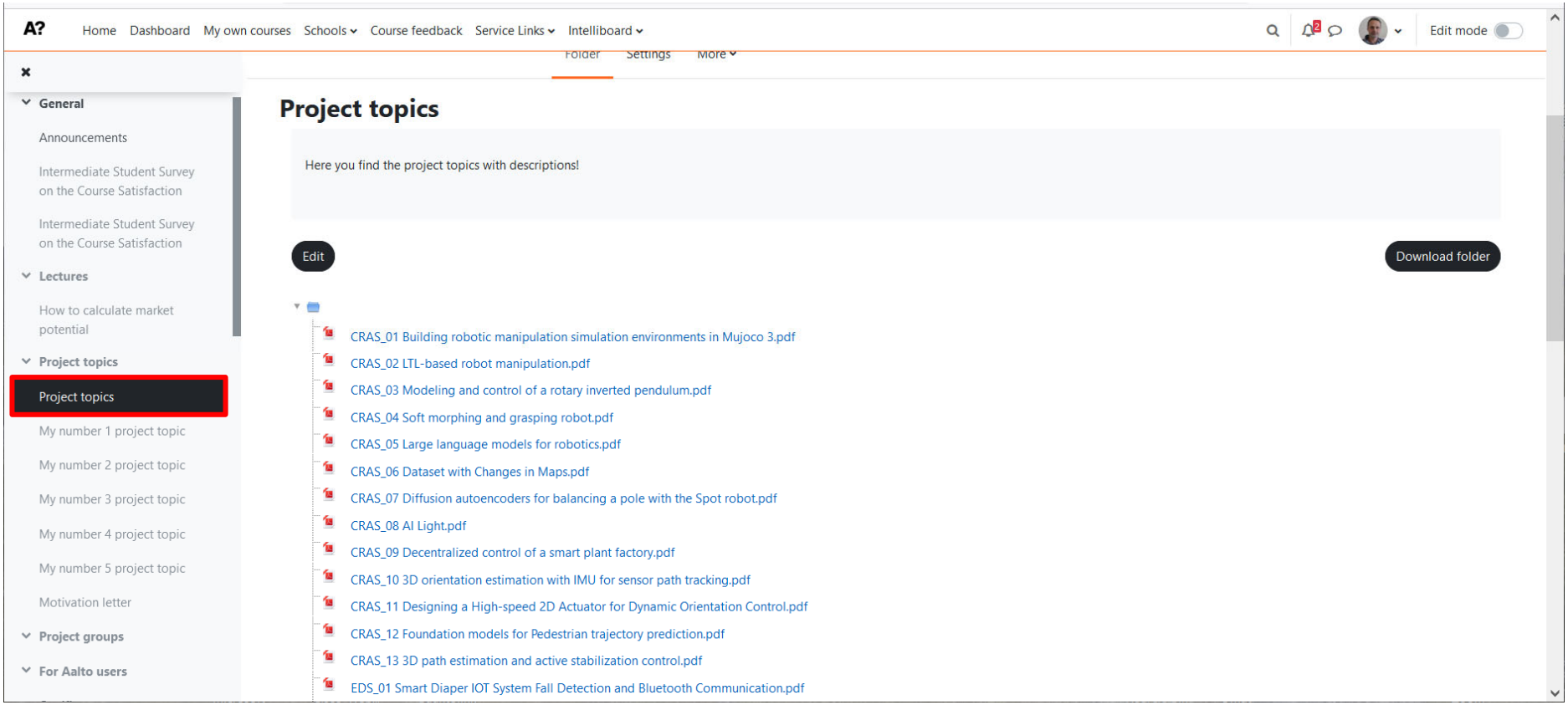
- which you are interested in,
- is suitable for your studies and
- allows you to develop your skills and get experience.

The project groups are formed by a teachers' board

Project Topics



Project Topics



Aalto University
School of Electrical
Engineering

Project Work 2024

Decentralized control of a smart plant factory

Instructor - Polina Ovsiannikova (polina.ovsiannikova@aalto.fi)

Abstract

Generally, vertical farms are greenhouses with growing trays stacked vertically and working according to hydroponic or aeroponic principles. Given imitation model of a vertical famring module, the task is to create a decentalized control, where modules decide on individual momentary energy consumption (fan speed) knowing the constraints given for the whole system. The imitation model and control follow IEC 61499 standard, and this standard shall be used in the automation architecture. Possibility of 5G communication between controllers in the vertical farming unit and implementation of the control from the remote cloud server shall be explored as well. In addition, the hardware implementation of a vertical farming module shall be completed.

This work requires software, electric / electronic engineering skills.
After this course, a student will be able to design, build and program a distributed system.

Business Aspect

The project topic is directly suitable for a business aspects exercise.
One of the product options: adaptive control for vertical farms and greenhouses

Skills Levels (0-5)

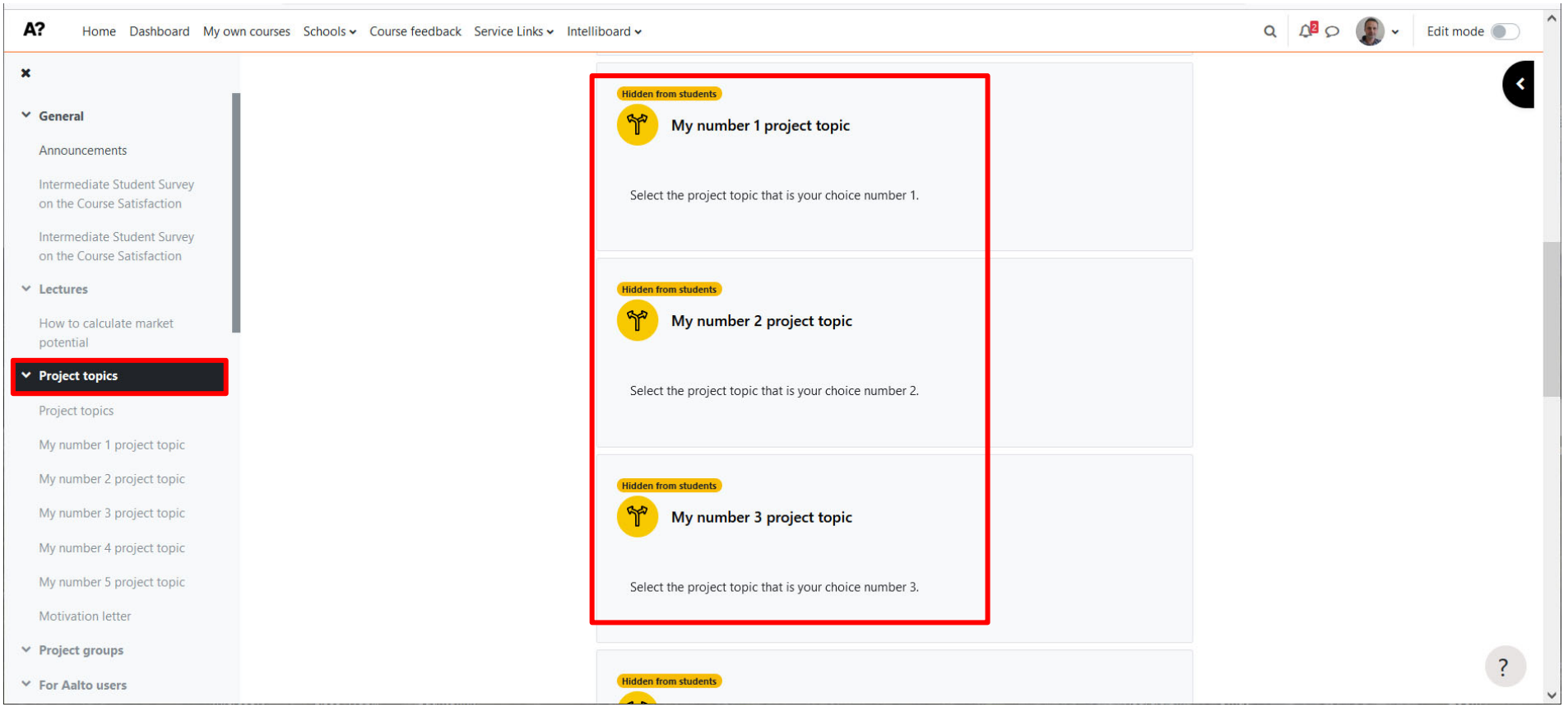
These keywords represent skills/knowledge that are relevant to this project

Skill	Level
Python Programming	2
CAD Software	1
Circuit analysis / design	2
Linux	1
Matlab/SImulink	2
Mechatronics	1
Microcontroller	2
PLC programming	4
Control engineering	1
Optimisation	3
Machine Learning	2

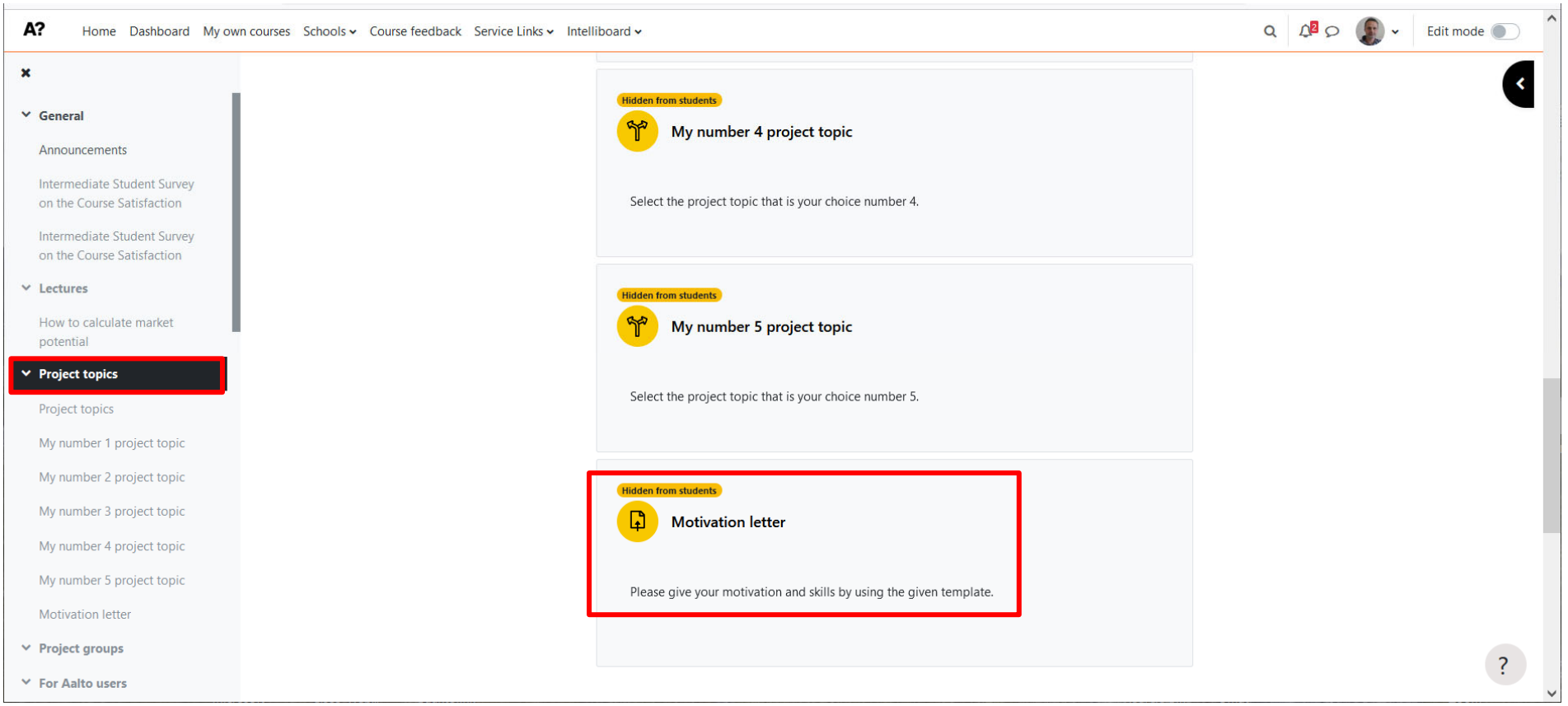
Study Path

Automation Software Engineering, Control Engineering, Factory Automation

Which will be your Project topic?



Which will be your Project topic?



Project manager

Each project must have a Project manager

- Besides working as a team member to solve technical challenges, the project manager is responsible for the planning of work, using resources and reporting the progress, etc.

The project group selects one member as project manager

- The project manager is named in the submitted Project plan, therefore the DL is the same as for the Project plan: 8.2.2024

A certificate is given to all students that complete the course. The role of a Project manager is stated in the certificate.

Project plan

The Project plan is an important document

- it presents a realistic planned schedule
- it serves as an agreement with you and the instructor

About the Project plan

- Typical length is about 15-20 pages
- Template for the Project plan is given, it will be published and presented in the next lecture
- Deadline is 8.2.2024 but it must be pre-accepted by the instructor
- Requires a lot of communication with the instructor.
- We will continue from this on Tuesday 23.1

Business case exercise

Lauri Palva is the responsible teacher for this part.

As a part of your Project, you need to do a business case exercise

- The exercise can be directly based on the topic, as a product or service
- or it can be indirectly based on the topic, a side-plan originated from some theme related to the topic.

It is recommended that weeks 9-11 (starting 27.2.) are reserved for this activity

- that is, not too many parallel activities in your project (you define your schedule in Project plan)

Business aspects events

Kick-off lecture Tuesday 27.2.2024

- The lecture will start the Business case exercise, you will hear about document template, general requirements and procedures for seminar. Value proposition canvas is introduced.

Lecture Thursday 29.2.2024: Product concept

- A development path from science to a sellable product is described.

Lecture Tuesday 5.3.2024: Intellectual property rights

- Includes copyrights, patents, trademarks, etc.

Personal meeting with a teacher (optional): Thursday 7.3.2024

- Each project group can book an appointment with the teacher responsible for the business case exercise.

Business pitches

The seminar is on Tuesday 12.3.2024

- The purpose of the seminar is that the project groups get experience of making and giving a business pitch. Furthermore, feedback is given for each group after their presentation to support the making of the final business case document.
- A template for the business pitch is on MyCourses.
- Further instructions and schedule will appear on the “Project tasks“ section on MyCourses before the business case kick-off lecture
- There will be three sessions, the sessions are preliminary scheduled for time slots 8:15-10:00, 10:15-12:00, 12:15-14:00.
- You **must participate in your own session**, participation in other sessions is optional.

Business case document

Business case document

- Typical length is about 10-15 pages.
- A template for the document is in MyCourses.
- Feedback is given in the Seminar and in the personal meetings.
- Submit the Business case document to MyCourses by 15.3.2024

We will continue from this on Tuesday 27.2.

Developing communication competence

- **Communication teachers collaborating: Rinna Toikka + Tuuli Nilsson**

- **Learning objectives: teamwork / group communication competence / presenting your project / evaluation**

- **Esssential working life skills….**

  How do we develop these skills?

Our job…

- to support the group process + presentations

- 6.2. (?) Lecture on group communication / project work skills
- Visiting the groups before midterm evaluation

- Pitching seminar – feedback

- Presentation workshops and peer feedback later..
  (non-mandatory)

Something to think about..

- Define your goals
- Check your schedule
- Define your competence / what do you want to learn?

  - - - regarding the project & communication competence

- Start talking about communication right away
- Don´t hesitate to contact the teachers

Check: aalto teamwork first-aid kit

Other services and support

Speech clinic: rinna.toikka@aalto.fi

LC-0550 Communication skills

LC-0320 Public speaking skills

LC-0530 Public speaking and stage fright

LC-0330 Leadership communication

LC-0224 Negotiation skills

LC-0340 Working life communication skills

LC-0520 Impact and argumentation

LC-0350 Listening

LC-0351 Nonverbal communication

Grading system

Grading is individual

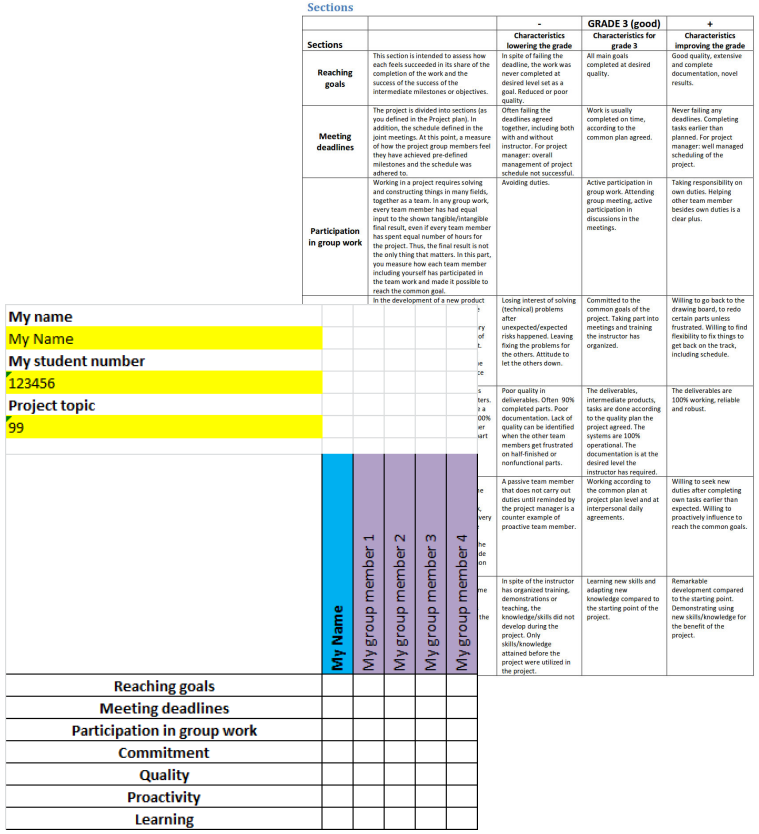
- not the same for every project group member

Grading is based on

- self-assessment in 7 sections
- peer-evaluation in 7 sections, within Project group
- instructor evaluation in 7 (+2) sections

Evaluation is done twice

- Week 12
- Week 21



Sections

Sections		- Characteristics lowering the grade	GRADE 3 (good) Characteristics for grade 3	+ Characteristics improving the grade
Reaching goals	This section is intended to assess how each feels succeeded in its share of the completion of the work and the success of the success of the intermediate milestones or objectives.	In spite of failing the deadline, the work was never completed at desired level set as a goal. Reduced or poor quality.	All main goals completed at desired quality.	Good quality, extensive and complete documentation, novel results.
Meeting deadlines	The project is divided into sections (as you defined in the Project plan). In addition, the schedule defined in the joint meetings. At this point, a measure of how the project group members feel they have achieved pre-defined milestones and the schedule was adhered to.	Often failing the deadlines agreed together, including both with and without instructor. For project manager: overall management of project schedule not successful.	Work is usually completed on time, according to the common plan agreed.	Never failing any deadlines. Completing tasks earlier than planned. For project manager: well managed scheduling of the project.
Participation in group work	Working in a project requires solving and constructing things in many fields, together as a team. In any group work, every team member has had equal input to the shown tangible/intangible final result, even if every team member has spent equal number of hours for the project. Thus, the final result is not the only thing that matters. In this part, you measure how each team member including yourself has participated in the team work and made it possible to reach the common goal.	Avoiding duties.	Active participation in group work. Attending group meeting, active participation in discussions in the meetings.	Taking responsibility on own duties. Helping other team member besides own duties is a clear plus.
	In the development of a new product	Losing interest of solving (technical) problems after unexpected/expected risks happened. Leaving fixing the problems for the others. Attitude to let the others down.	Committed to the common goals of the project. Taking part into meetings and training the instructor has organized.	Willing to go back to the drawing board, to redo certain parts unless frustrated. Willing to find flexibility to fix things to get back on the track, including schedule.
		Poor quality in deliverables. Often 90% completed parts. Poor documentation. Lack of quality can be identified when the other team members get frustrated on half-finished or nonfunctional parts.	The deliverables, intermediate products, tasks are done according to the quality plan the project agreed. The systems are 100% operational. The documentation is at the desired level the instructor has required.	The deliverables are 100% working, reliable and robust.
		A passive team member that does not carry out duties until reminded by the project manager is a counter example of proactive team member.	Working according to the common plan at project plan level and at interpersonal daily agreements.	Willing to seek new duties after completing own tasks earlier than expected. Willing to proactively influence to reach the common goals.
		In spite of the instructor has organized training, demonstrations or teaching, the knowledge/skills did not develop during the project. Only skills/knowledge attained before the project were utilized in the project.	Learning new skills and adapting new knowledge compared to the starting point of the project.	Remarkable development compared to the starting point. Demonstrating using new skills/knowledge for the benefit of the project.

My name
My Name
My student number
123456
Project topic
99

	My Name	My group member 1	My group member 2	My group member 3	My group member 4
Reaching goals					
Meeting deadlines					
Participation in group work					
Commitment					
Quality					
Proactivity					
Learning					

		-	GRADE 3 (good)	+
Sections		**Characteristics lowering the grade**	**Characteristics for grade 3**	**Characteristics improving the grade**
Reaching goals	This section is intended to assess how each feels succeeded in its share of the completion of the work and the success of the success of the intermediate milestones or objectives.	In spite of failing the deadline, the work was never completed at desired level set as a goal. Reduced or poor quality.	All main goals completed at desired quality.	Good quality, extensive and complete documentation, novel results.
Meeting deadlines	The project is divided into sections (as you defined in the Project plan). In addition, the schedule defined in the joint meetings. At this point, a measure of how the project group members feel they have achieved pre-defined milestones and the schedule was adhered to.	Often failing the deadlines agreed together, including both with and without instructor. For project manager: overall management of project schedule not successful.	Work is usually completed on time, according to the common plan agreed.	Never failing any deadlines. Completing tasks earlier than planned. For project manager: well managed scheduling of the project.
Participation in group work	Working in a project requires solving and constructing things in many fields, together as a team. In any group work, every team member has had equal input to the shown tangible/intangible final result, even if every team member has spent equal number of hours for the project. Thus, the final result is not the only thing that matters. In this part, you measure how each team member including yourself has participated in the team-work and made it possible to reach the common goal.	Avoiding duties.	Active participation in group work. Attending group meeting, active participation in discussions in the meetings.	Taking responsibility on own duties. Helping other team member besides own duties is a clear plus.
Commitment	In the development of a new product or other expected output, there are often situations where due to unforeseen difficulties, it is necessary to do some things again and a part of the design/construction work is lost. Commitment means, above all, the ability to find new solutions until the technology is at adequate level, once again.	Losing interest of solving (technical) problems after unexpected/expected risks happened. Leaving fixing the problems for the others. Attitude to let the others down.	Committed to the common goals of the project. Taking part into meetings and training the instructor has organized.	Willing to go back to the drawing board, to redo certain parts unless frustrated. Willing to find flexibility to fix things to get back on the track, including schedule.
Quality	In this section, the quality of various deliverables within the project matters. Excellent quality means for instance a well tested and well documented 100% working part/subsystem that another team member may integrate. The part may be CAD model, mathematical equation, software code, manufactured piece, or piece of documentation.	Poor quality in deliverables. Often 90% completed parts. Poor documentation. Lack of quality can be identified when the other team members get frustrated on half-finished or nonfunctional parts.	The deliverables, intermediate products, tasks are done according to the quality plan the project agreed. The systems are 100% operational. The documentation is at the desired level the instructor has required.	The deliverables are 100% working, reliable and robust.
Proactivity	Project based work often involves parallel tasks that can be done at the same time. Sometimes unexpected risks may delay progress in one task, for instance due to delay in the delivery of a certain component, or a device failure. However, in the meantime other duties may be completed in the project. Proactivity means an attitude to actively work towards the common goal.	A passive team member that does not carry out duties until reminded by the project manager is a counter example of proactive team member.	Working according to the common plan at project plan level and at interpersonal daily agreements.	Willing to seek new duties after completing own tasks earlier than expected. Willing to proactively influence to reach the common goals.
Learning	How has the knowledge of person developed compared to the start time of the project? At this point, it is measured, how much knowledge is developed and how important the new knowledge is for the project.	In spite of the instructor has organized training, demonstrations or teaching, the knowledge/skills did not develop during the project. Only skills/knowledge attained before the project were utilized in the project.	Learning new skills and adapting new knowledge compared to the starting point of the project.	Remarkable development compared to the starting point. Demonstrating using new skills/knowledge for the benefit of the project.

Student 1 name

WEIGHTS	
Reaching goals	11 %
Meeting deadlines	11 %
Participation in group work	11 %
Commitment	11 %
Quality	11 %
Proactivity	11 %
Learning	11 %
Final results	11 %
Documentation	12 %
SUM	100 %

	SELF (Intermediate)	SELF (Final)	My Group Member 1 (Intermediate)	My Group Member 1 (Final)	My Group Member 2 (Intermediate)	My Group Member 2 (Final)	My Group Member 3 (Intermediate)	My Group Member 3 (Final)	My Group Member 4 (Intermediate)	My Group Member 4 (Final)	My Group Member 5 (Intermediate)	My Group Member 5 (Final)	PEER AVG	INSTRUCTOR	AVERAGE
Reaching goals													#DIV/0!		#DIV/0!
Meeting deadlines													#DIV/0!		#DIV/0!
Participation in group work													#DIV/0!		#DIV/0!
Commitment													#DIV/0!		#DIV/0!
Quality													#DIV/0!		#DIV/0!
Proactivity													#DIV/0!		#DIV/0!
Learning													#DIV/0!		#DIV/0!
Final results															0
Documentation															0
														Weighted AVG	#DIV/0!

The Intermediate Decision	
The Final Decision	

Reasoning for grade

WEIGHTS	
Self assessment	25 %
Peer evaluation	25 %
Instructor evaluation	50 %
SUM	100 %

A?

Student 1 name	SELF A	SELF B	My Group Member 1 (A)	My Group Member 1 (B)	My Group Member 2 (A)	My Group Member 2 (B)	My Group Member 3 (A)	My Group Member 3 (B)	My Group Member 4 (A)	My Group Member 4 (B)	My Group Member 5 (A)	My Group Member 5 (B)	PEER AVG	INSTRUCTOR	AVERAGE
Reaching goals	3	5	2	4	4	5	3	5	3	5	3	5	3,9	5	4,48
Meeting deadlines	2	4	1	3	3	5	2	4	2	4	2	4	3,0	4	3,50
Participation in group work	2	4	1	3	3	5	2	4	2	4	2	4	3,0	4	3,50
Commitment	2	4	1	3	3	5	2	4	2	4	2	4	3,0	4	3,50
Quality	3	3	2	2	4	4	3	3	3	3	3	3	3,0	3	3,00
Proactivity	2	4	1	3	3	5	2	4	2	4	2	4	3,0	4	3,50
Learning	3	5	3	5	4	5	3	5	3	5	3	5	4,1	5	4,53
Final results														4	4
Documentation														5	5
													Weighted AVG		3,9

The intermediate decision	2
The final decision	4

Reasoning for grade

Participation and commitment in the beginning was quite poor but increased drastically during the project. Aslo proactivity and learning improved significantly as project proceeded.

Final Gala

The Final Gala will take place in TUAS building Thursday 23.5.2024

- An ”all day” activity, **mandatory**, mark in your calendar the date and hours 8-18!
- Projects are presented to visitors in the exhibition lobby and the highligts are presented in the lecture room

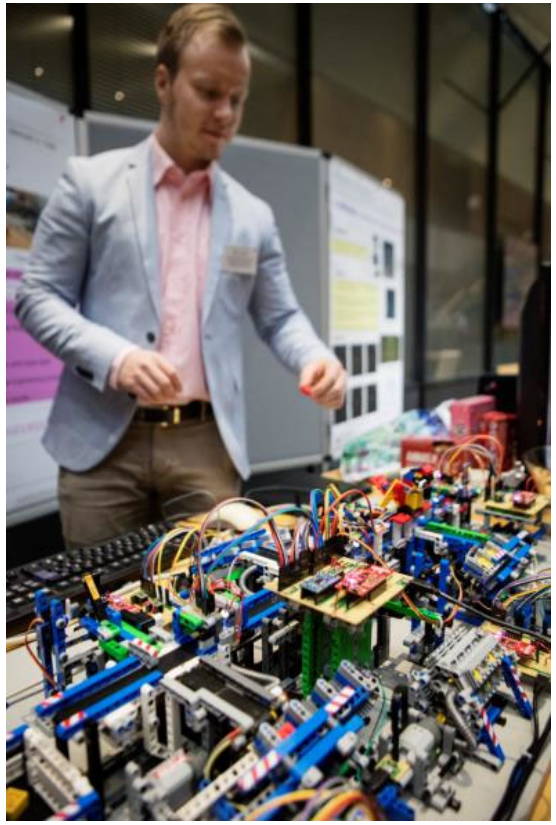
Each project has its own stand

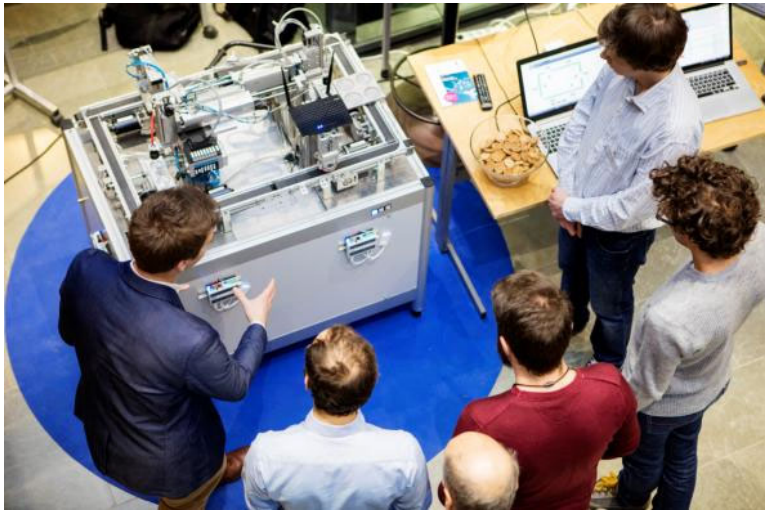
- with 32” display and a table.

The Final Gala is your target date to have all development ready

- If you have equipment to show, make a plan how to present it.
- After the Gala, you still have some days to complete the Final report.

Final Gala





Substitutive courses in AEE Program

At least these courses could be used to replace this course

- JOIN-E3000 Life Science Technologies Project, 10 cr
- MEC-E3001 Product Development Project (PDP), 10 cr
- MEC-E5002 Mechatronics Project, 10 cr
- ELEC-E4930 Space technology project, 10 cr
- AAE-E3000 - Advanced Energy Project L, 10 cr.

Note: Check whether it is possible for you to participate!

Other possible project work courses as a substitute

- If you are aware of similar 10 credit M.Sc level courses organized in Aalto University with similar learning outcomes, let us know and we will discuss with their course staff, to see the equivalence

Note: ELEC-D0301 Protopaja (B.Sc level) cannot be used as substitutive!

You need to get approval from the head of the major i.e. justification for the substitution is needed!

Conclusions - The urgent ones!

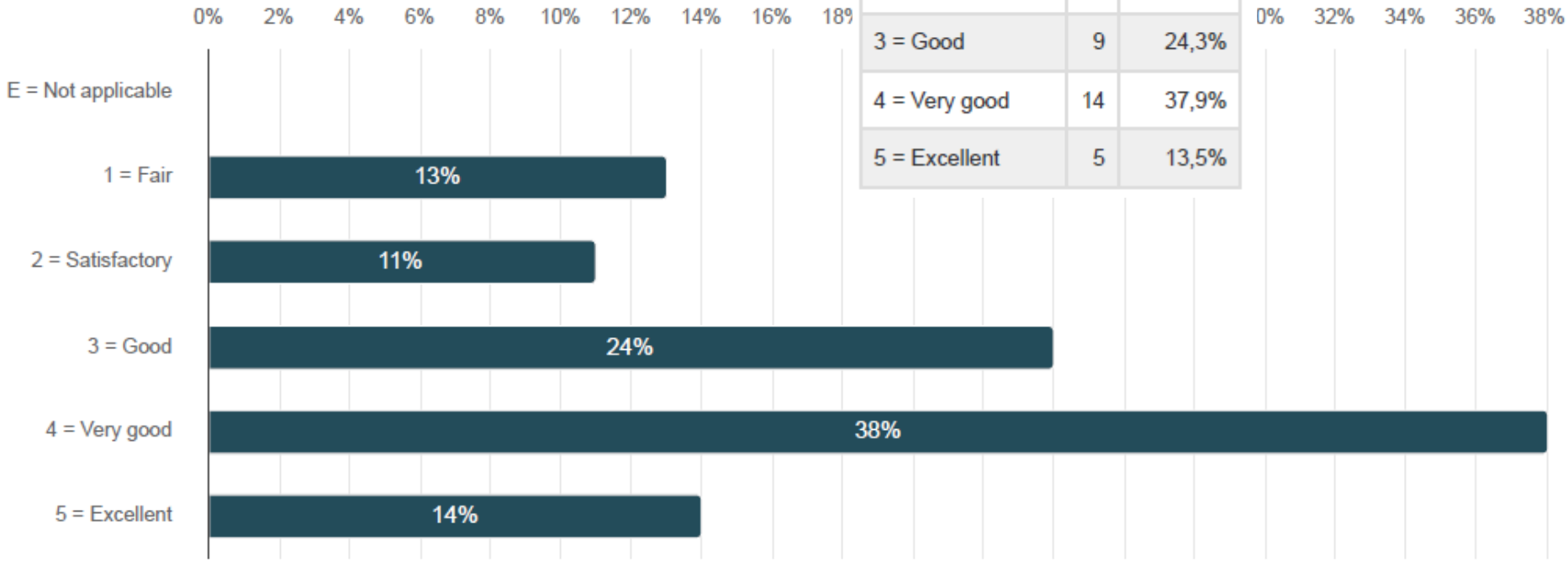
- **Check through the Project topics (in MyCourses)**
- **Submit your five 5 preferred project topics (in MyCourses)**
  DL 15.1.2024 @12:00
- **19.1 project groups are revealed**
- **23.1 @12:15-14:00 Project planning lecture, meet your group and instructor**

- **NB: About e-mail: we will communicate directly with you occasionally during the course, e.g., grading etc.**
- Make sure your AALTO e-mail is operational and you use it!

2023 Feedback

	n	Prosentti
E = Not applicable	0	0,0%
1 = Fair	5	13,5%
2 = Satisfactory	4	10,8%
3 = Good	9	24,3%
4 = Very good	14	37,9%
5 = Excellent	5	13,5%

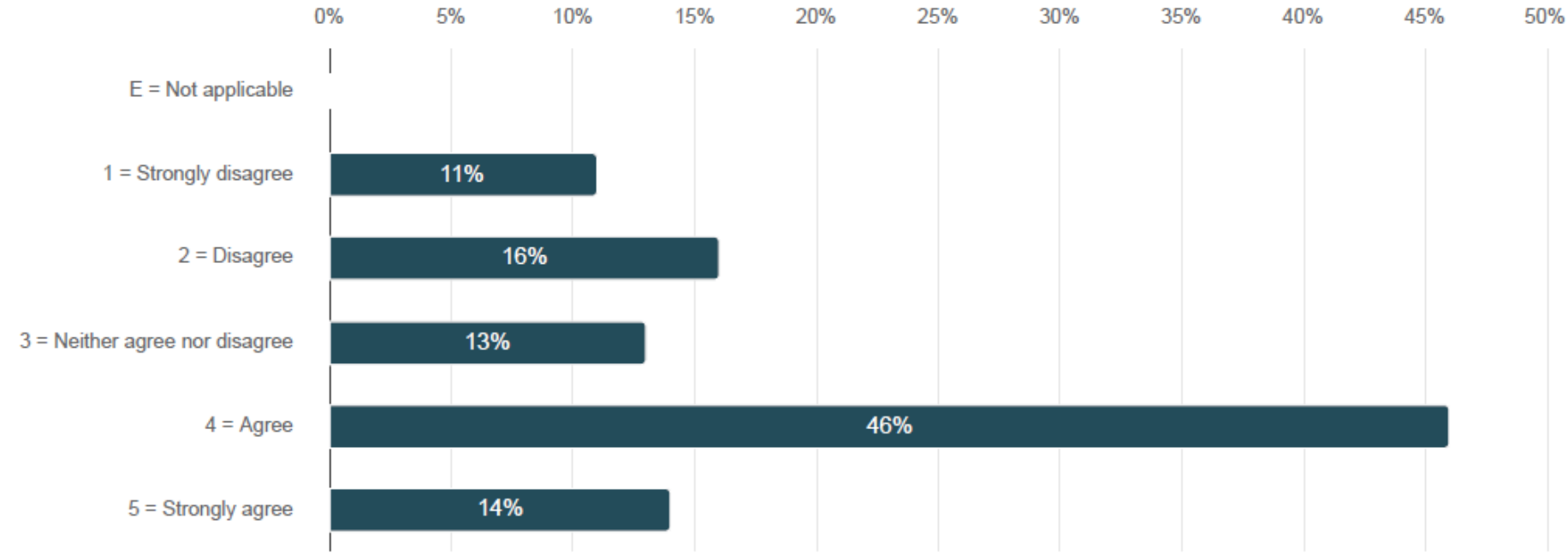
Avg. = 3.3



2023 Feedback

The teaching methods (lectures, labs, group work, online study, assignments etc.) supported my learning

Number of respondents: 37

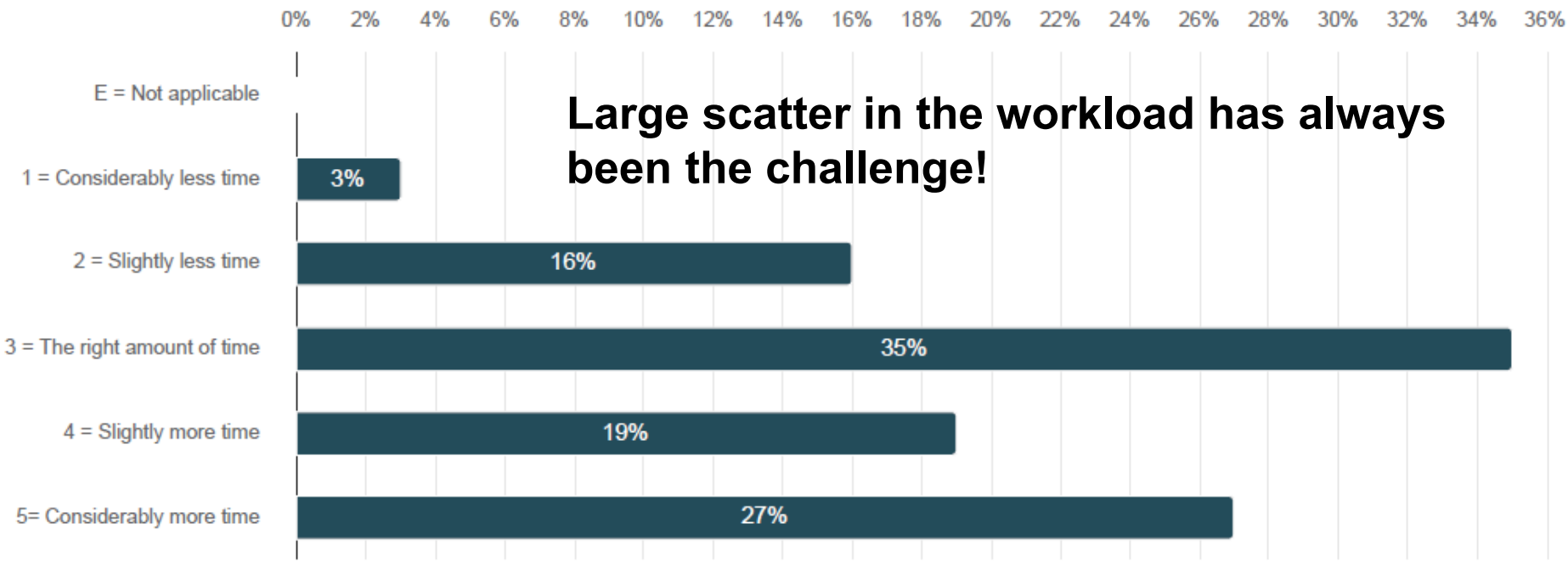


2023 Feedback

270h/20wk=> 13.5h/wk

According to the guidelines, one credit (ECTS) requires 27 hours of student work. Compared with this, the completion of the course required

Number of respondents: 37



Large scatter in the workload has always been the challenge!

2023 Open feedback (few selected ones)

- ” It was really one of the nice and challenging course. I learnt a lot in this course as we came across different tasks and goals. Great course to learn something new”
- “No comment other than thank you for the help during this course.”

  => generally positive feedback, **but…**

- “Our instructors were unreasonable, demanded way more of us than other group’s instructors and over all provided a very toxic environment to work with”,
- “The business case took quite a lot time off from the actual project”,
- “The course shares the same problem as all the other group work courses, in that if you had bad lick with your team, your screwed for the rest of semester. Group work skills are taught in elementary school”
- “The course topics and the group member selection are not always fair. My teammate had no prior knowledge of selected subject”

Q&A