



# Advanced Project in Robotics

5 ECTS

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Introductory seminar  
January 22, 2026

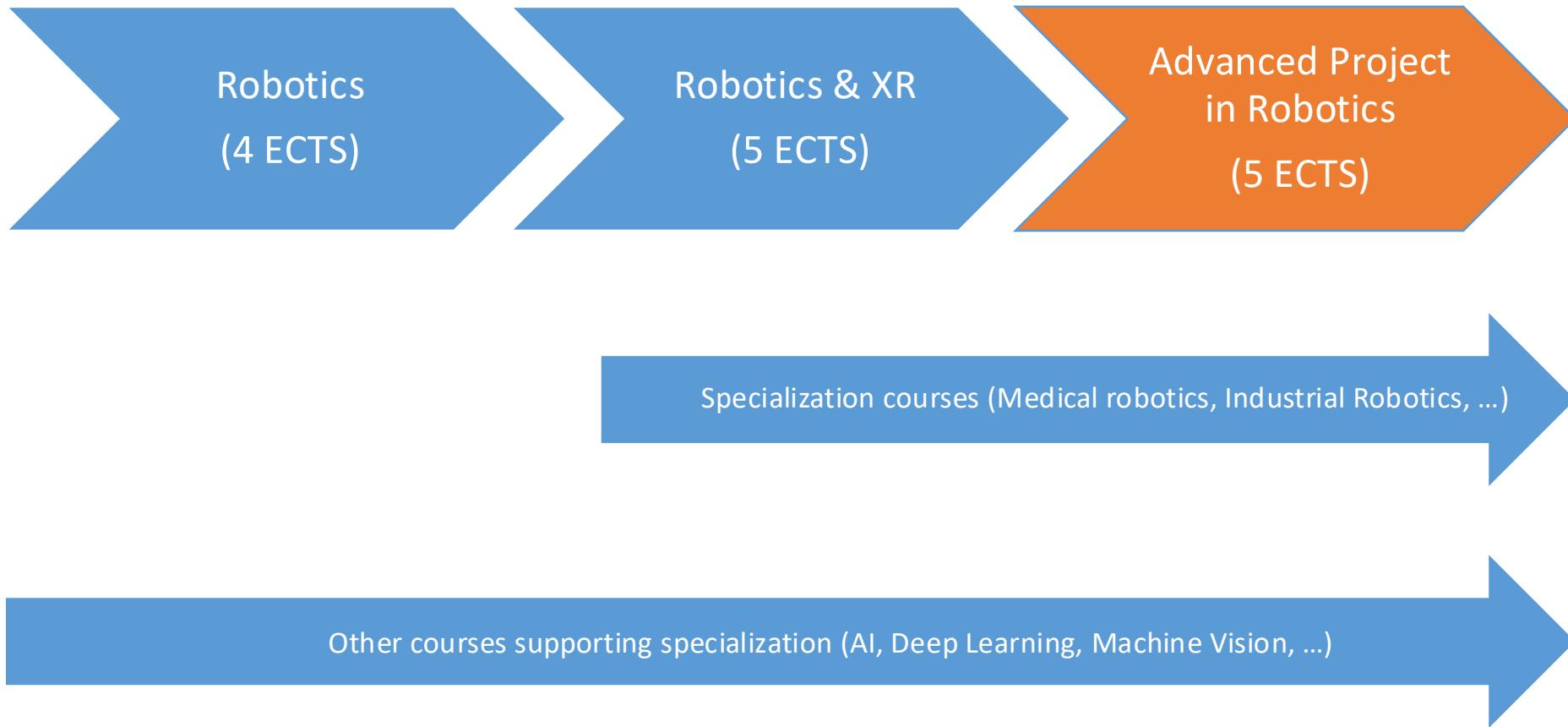
5 ECTS

Specialization in robotics (25 ECTS)

Specialization courses (Medical robotics, Industrial Robotics, ...)

Other courses supporting specialization (AI, Deep Learning, Machine Vision, ...)

# Robotics education at Soc / UEF



# Learning goals

On completion of the course, the student

- can **define** a large-scale robotics project designed for a real-life use case,
- **identify** and **select** the appropriate robotics environment (hardware and/or simulators) and other working tools to carry out the project,
- be able to use the ROS 2 application framework or other similar application development tools to **manage** and **implement** large-scale robotics projects,
- master the **phasing** and **documentation** of large-scale projects.

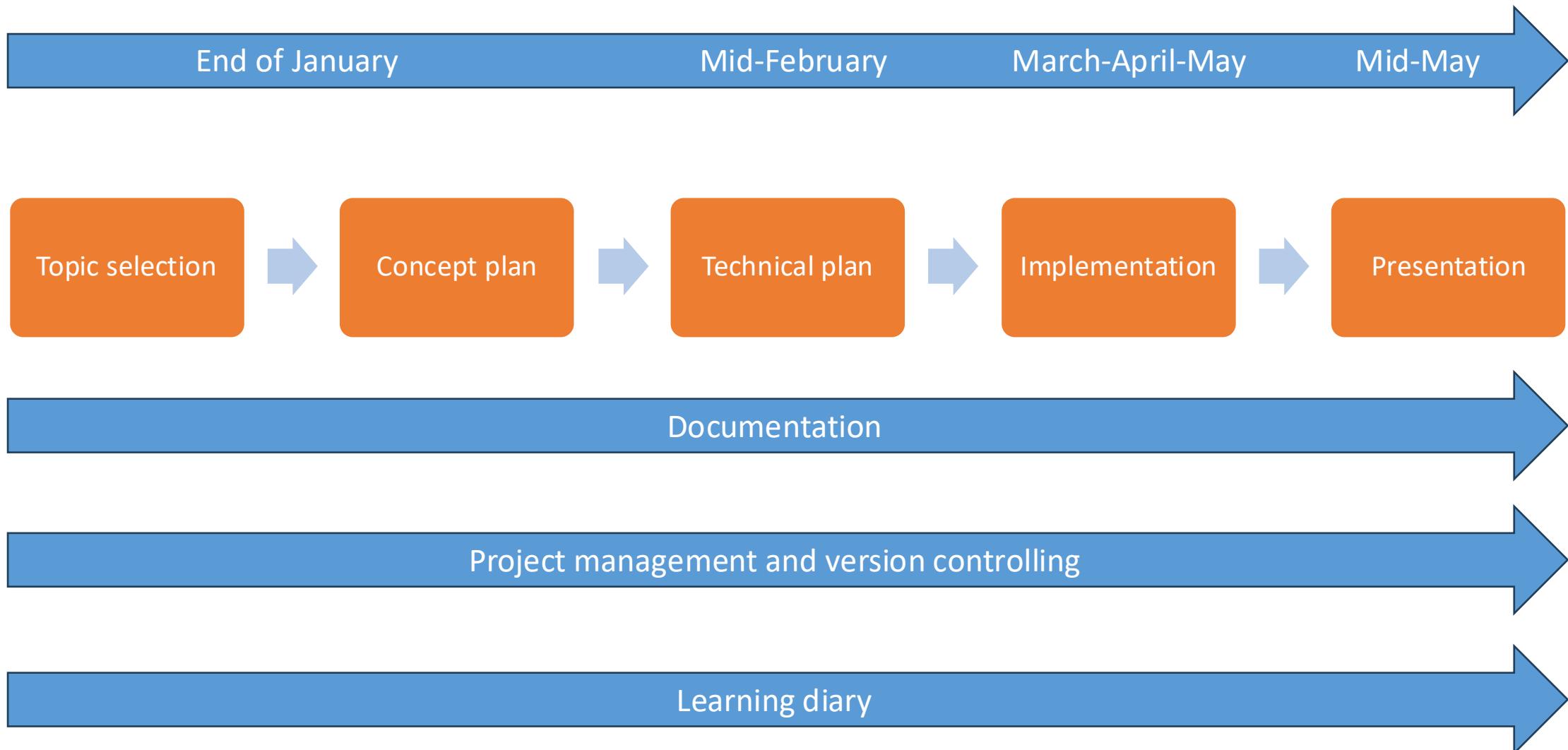
# Course content

**Defining** a robotics project (identifying the target and the need), **selecting** the appropriate **tools** for the project, **installing** and **configuring** the working environment, project **implementation**, version control, **documenting** and **presenting** the project.

# Course organization

- Elective course in advanced studies
- Compulsory introductory and follow-up seminars 6 hours
- Optional project counselling at least 20 hours
- Project presentation seminar 4 hours
- Group or independent work ~100 hours

# Process



# Seminars

- Mandatory to participate
- Introductory seminar: January 22
- Technical and implementation plan presentations: February 20
- Mid-project follow-up: March 20
- Final presentations: May 12 (seminar or open showcase)

# Project guidance

- Times as indicated in Peppi (2 hrs / session)
- January 30
- February 6, 13, 27
- March 6, 13, 26
- April 17, 23
- May 8

# Evaluation

- Detailed evaluation scheme will be announced once we know the nature of the projects, but it will be roughly as follows:
- Concept note and technical plan: 10%
- Project implementation (quality and functionality of the implementation): 50%
- Project management and documentation (incl. video of the final product): 15%
- Project presentation: 10%
- Group's self-evaluation: 5%
- Individual learning diary: 10%
- Overall evaluation 1-5, to pass you need 50%, to get 5/5 you need 90%

# Project reporting and submission

- Introduction and conceptual plan (context, challenges, why this tool was needed, etc. You can use the submitted concept plan to form this part)
- Technical implementation of the tool / project, show clearly the architecture of the project
- Description of how the final project outcome operates and the operation environment that the potential user need to set. You may also use screenshots showing the settings and/or operational features.

# Project reporting and submission

- Codebase of your project in GitHub or similar versioning system, or in a zip package in Google Drive / Dropbox / OneDrive etc. Make a link to the repository / package available in your document and make sure that the link is accessible without authentication
- A short (max 5 min) video describing your project. You can make the video available at YouTube, Google Drive, OneDrive, etc.
- A separate section / sub-topic describing every group member's contribution to the project and the number of hours he or she dedicated for the project work and documentation.
- Your group's self-evaluation in the scale 1-5 and a short justification for the grade. The self-evaluation will be added to the final points of the project work, if the justification is deemed sufficient by the teachers.

# Project reporting and submission

- Submit to Moodle
- Submit only PDF documents
- Include links to GitHub / videos / other repositories in the document
- Use pictures, diagrams, etc. to showcase your project

# Interaction and submissions

- Moodle: <https://elearn.uef.fi/course/view.php?id=14010>
- Key: APR-2026
  - Material sharing, group formation, project submission, learning diary
- Discord
  - Proposal to use Robotics & XR course Discord server with a private channel for the project work

# About project presentations

- May 12
- Seminar?
- Open showcase at Science Park?
- Or both?
- Possibility to present at SciFest 2026?



# Technologies available

- Project implementation may be based on hardware or simulation
- Ready-made robots
  - Universal Robot UR3e (articulated robot arm, "cobot", 6 DOF)
  - TurtleBot 3 & 4
  - Trossen Robotics PincherX 100 robot arm (4 DOF)
  - UGV Rover 4WD
- Various robotics sets (Arduino, Raspberry Pi)
- DIY robotics sets
  - Arduinos, Raspberry Pi, NVIDIA Jetson, plenty of robotics components
  - Legos
- If you need something specific, we may consider purchasing

# Technologies available

- Simulators: Gazebo, rviz, Webots
- Integration with ROS 2
- Various types of XR devices (headsets, tracking systems, sensors)
- 3D printing
- You can work
  - at home
  - in the Science Park lab (workstations available) – especially if you use one of the ready-made robots (shared resources)

# Some project ideas

- Physical implementation of Andino robots (familiar from the RXR course), testing your own navigation / path planning algorithm with the real robot
- Combining PincherX 100 with TurtleBot for autonomous pick-and-delivery task
- Pick and place from a conveyor belt with UR3
- Efficient mapping and path planning for a robot vacuum cleaner (TurtleBot 4)
- Novel human-robot-interaction with Large Language Models

# Some project ideas

- “ROSifying” FlexiRover Universal
- Something with UGV Rover 4WD, machine vision / AI tasks?
- “Mars Rover Bot simulator” with a real robot



# Some project ideas (titles from RXR courses)

- Turtle“Voice”Bot: Speaker-Responsive NLP Robot
- Robotic Arm in VR Environment
- Rubik’s Cube solver robot
- Intelligent Home Security bot
- Robot Drummer