



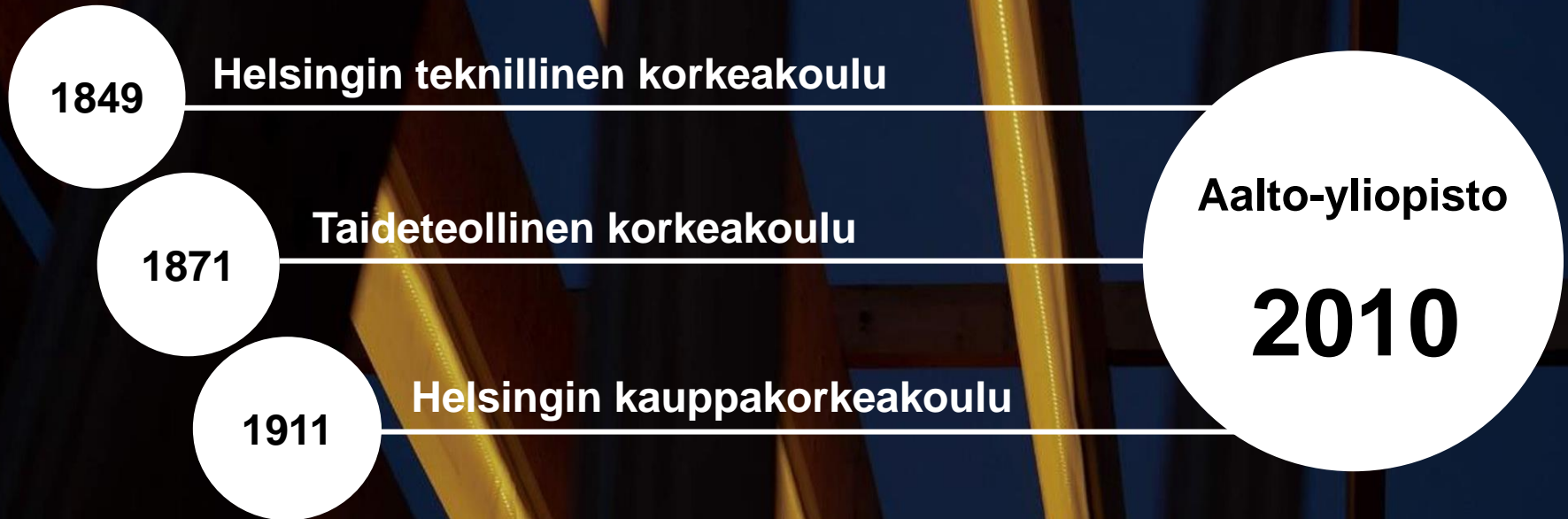
Aalto University
School of Engineering

Education at Aalto, at School of Engineering and at Marine Technology

Jani Romanoff (Professor, Vice Dean of Education)

25.8.2023

Merger of 3 Universities





12 000

Degree students (FTE)

Personnel **4 000**,
400 professors.

International faculty **40 %**.

KPI's

250 D.Sc.,

1 800 M.Sc.,

1 300 B.Sc.

300 MBA

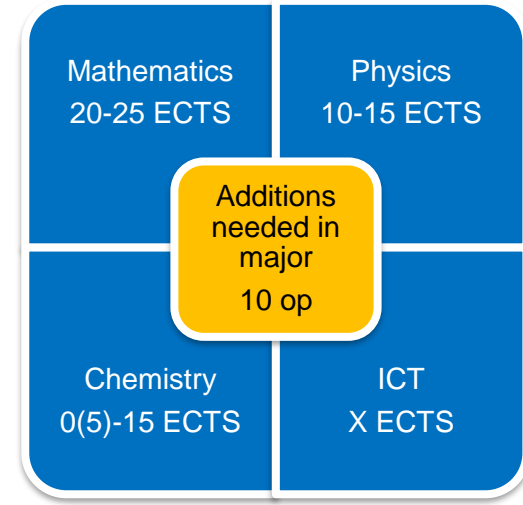
B.Sc. Program in Engineering



Aalto-yliopisto
Aalto-universitetet
Aalto University

Viewpoint of Student

- Accounting the reorganisation of education at high schools during recent years (LUMA/STEM)
- Highlighting the needs for B.Sc. programs better
- During first years of studies “path-finding” from start of B.Sc. to M.Sc. graduation is enabled by academic advising and clear communication of critical paths
- Clear transition rules to allow the path-changing as studies progress
- Selected current M.Sc. courses are to be given already at B.Sc. level to motivate students and to give competitive edge in international programs



Four Pillars of Guided Pathways



Create clear curricular pathways to employment and further education.



Help students choose and enter their pathway.



Help students stay on their path.



Ensure that learning is happening with intentional outcomes.

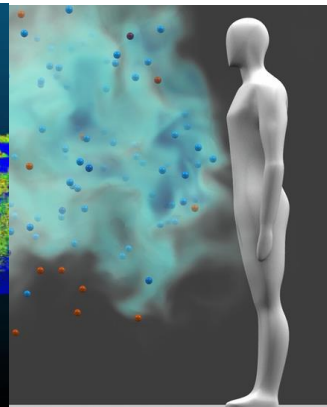
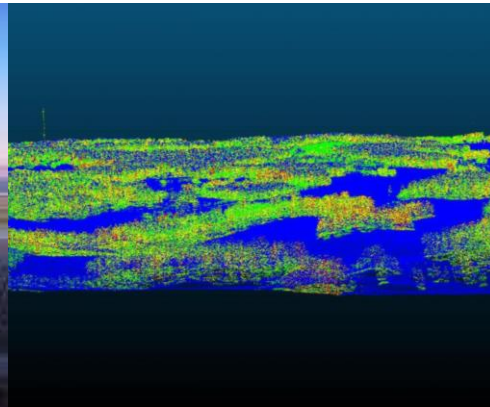
Changes to Bachelor Programme in Engineering

Current majors/application targets (420)

- Energy and Environmental Technology (ENY)
- Mechanical and Civil Engineering (KJR)
- Build Environment (RYM)
- Computational Engineering (COE)

New Majors/application targets starting from autumn 2022 (460)

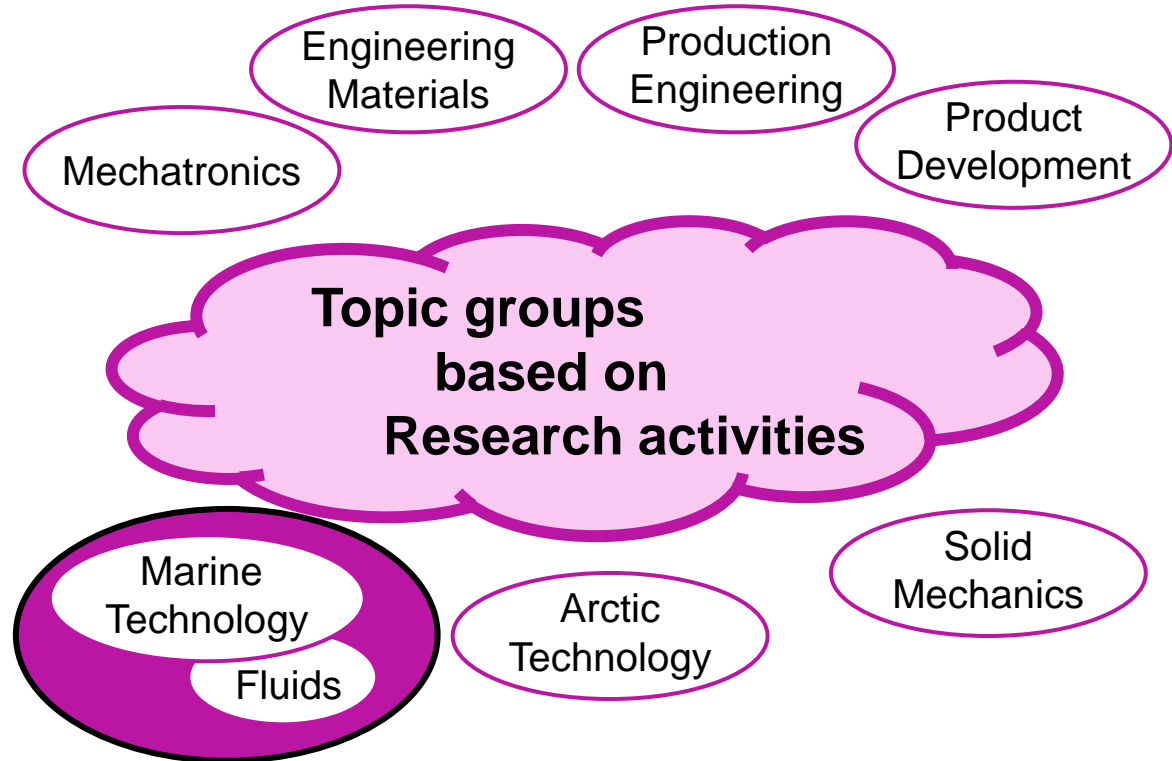
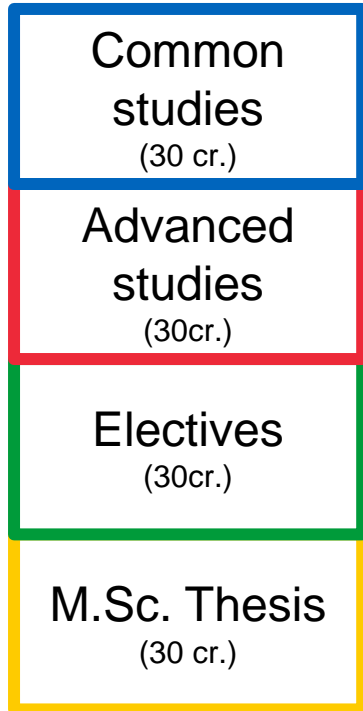
- Energy Technology and Mechanical Engineering (EKO)
- Civil Engineering (RAK)
- Sustainable Communities (KEY)
- Real Estate Economics and Geoinformatics (KIG)
- Computational Engineering (COE)



M.Sc. Programme in Mechanical Engineering

Structure and content

Topic groups



Intended engineering professions

Systems engineers

- Understanding and designing complex systems of different scales

Entrepreneurial engineers

- Creating innovative design necessary to develop products, processes and services that are competitive in a global economy

Engineering scientists

- Conducting basic research, which is necessary to address compelling global challenges such as energy sustainability

Engineering managers

- Leading global projects and businesses

Marine Technology Education

Teaching staff

Professors



Spyros Hirdaris



Mashrura Musharraf



Heikki Remes



Jani Romanoff



Pekka Ruponen
(Part time)



Osiris Valdez
Banda



Tommi Mikkola



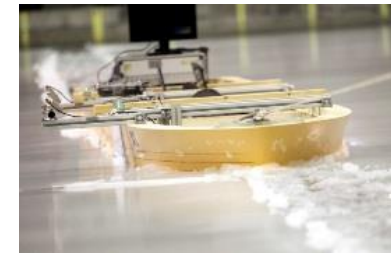
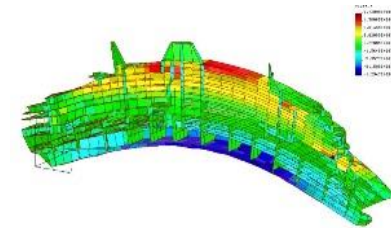
Marjo Keiramo
(Part time)

Lecturer

Teaching in Marine Technology

- **In-depth understanding of maritime engineering; principles for design and construction,**
 - Hydrodynamics, loads, structural analyses, stability, risk of marine traffic and winter navigation
- **Problem-based learning; theory is supported by experimental work, computer simulations, and project works**
- **Study path examples:**
 - Naval Architecture
 - Arctic Marine Technology
 - Ship Project Engineer
 - Structural Expert
 - Hydrodynamic Expert
 - *Autonomous marine operations*

The selected study path can be focused based on student interest by specialisation courses from other Master programme, e.g. cross-disciplinary minor



Teaching in Marine Technology

Marine Major

Target Group and Learning Objectives: Naval architects and focus related sub-fields of engineering with focus on first-principles.

Execution: 120 ECTS. Problem-based learning with static curriculum and relevant cases from industry. Specialization in collaboration with university network (Nordic 5 Tech: NMME, CCE – CTH, NTNU, DTU)

Marine Minor

Target Group and Learning Objectives: Engineers, Economist, Architects, Industrial Designers, Natural Sciences. People who can utilize their expertise in maritime.

Execution: 10-25 ECTS. Courses offered inside Aalto and FITech network (UTU, ÅA, LUT, TUT, UW, OU) by distance learning, problem-based learning etc.

Study path: Naval Architecture

Profile

Naval architect i ship as a system between different knowledge in flu essential to desigr of the ship wh amount of energy and is comfor passengers. Ships ice-covered sea: knowledge of ic necessary. Main design are covere stability, dynan systems and risk concept design is course and impro with justification chosen and final e

Studies

List of suitable cou path is shown or recommended (R (O) courses. All co

Work environmen

Shipyard and desi innovative ship de Alumni example is behind ground bi (e.g. "Oasis of t biggest cruise ship out-of-the-box ap systems.

Study path: Arctic Marine Technology

Profile

In Arctic marine technology the key competence is to understand the cold environment and its effects on the ship design, hull st requirements, navigatic safety of ships. This re knowledge on ship i analysis, solid and fluid and especially understa characteristics of ice i material. Aalto ice te utilised in the teach course will concentrat scale testing in ice. In few day excursion to th operating in the northe is organised every wint the winter navigation ci

Studies

List of suitable courses f path is shown on the recommended (RE) a (O) courses. All courses

Work environment

Shipyard, design and offices, ship owners c ice, offshore compa innovative arctic ship operational plans environment are crea example is s person, w an oil company and ha role in the recent large LNG projects in the Russian Arctic.



Study path: Project Engineer

Profile

The project engineer must understand the interlinked design and production processes and manage the economical, production and technological risks associated with large one-off prototype projects. It is essential to understand manufacturing methods and quality management methods as well as the role of material selection. Holistic project-based thinking and basic knowledge on ship technology is needed to create the future product in competitive fashion.

Studies

List of suitable courses for this study path is shown on the right, with recommended (RE) and optional (O) courses. All courses are 5 ECTS.



Courses

Common studies
Principles of Naval Architecture
Dynamics of rigid body
Fluid dynamics
Dynamics of structures

Fatigue of structures
Fracture mechanics
Thin-walled structures

Etc.

Award Examples

Education Impact award granted to marine technology and FITech

The Aalto Education Impact award was granted to Professor **Jani Romanoff**, Assistant Professor **Heikki Remes**, Professor **Pentti Kujala**, post doctoral researcher **Osiris A. Valdez Banda**, and Lecturer **Martin Bergström** for their outstanding efforts in game-changing education in marine technology in connection with the Finnish Institute of Technology (FITech) activities in the Turku area. President Niemelä noted that "The education uses new forms of collaboration boldly to develop expertise within a field of industry that is truly important to our society."



Congratulations to the the Winners of the Paper Contest 2020 as follows:

1st Prize:

"Nonlinear Effects in Wave Loads Analysis for a Mega Cruise Liner" by Karola Aaro (Aalto University)