Welcome to

ARCADA UNIVERSITY OF APPLIED SCIENCES

Arcada University of Applied Sciences

Welcome to the

Mechanical and Sustainable Engineering

(MSE)

arcada.fi

Teachers

Rene Herrmann
Senior Lecturer in Natural Sciences and Composite Materials

Paula Linderbäck
Principal Lecturer in Circular Economy

Rizwan Ullah
Senior Lecturer in Digital technologies

Silas Gebrehiwot
Senior Lecturer in Mechanical Engineering
Material testing

Sofie Sundström
Study Counsellor, Mechanical and Sustainable Engineering

Rasmus Björkvall
Laboratory engineer with project tasks

Stewart Makkonen-Craig
Senior Lecturer in Material Sciences

Harri Anukka
Laboratory engineer

Mathew Vihtonen
Senior Lecturer in Mechanical Engineering
Engineering Design

Laurits Møller
International Student Advisor

About Arcada

16 bachelor programmes

I. Mechanical and sustainable Engineering
II. International Business
III. Materialteknik och hållbarhet
IV. Culture Mangement
V. Energy and Environmental Engineering
….

Masters programmes

I. Machine Intelligence and Data Science (MIND)
II. Media Management
III. Leadership for Nordic Healthcare

ARCADA

189 Staff

2869 Students

163 publications

561 Graduates

2.4 Million € for research

Source: Annual report 2025

Engineering

"the study of using scientific principles to design and build machines, structures, and other things, including bridges, roads, vehicles, and buildings" [Cambridge]

"the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people" [Marriam Webster]

Difference between Science and Engineering?

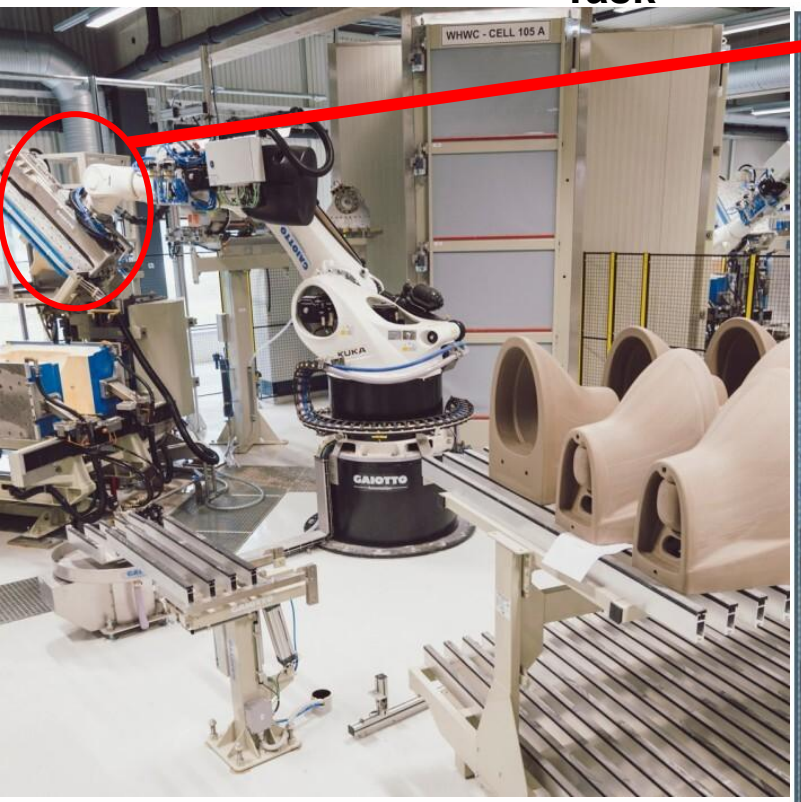
"Science is the process of understanding what is.
"Engineering is the process of creating what hasn't been." MIT

Simply put: Engineering is practical application of science, mathematics, and knowledge to **solve real-world problems** and providing cheaper and sustainable solutions.

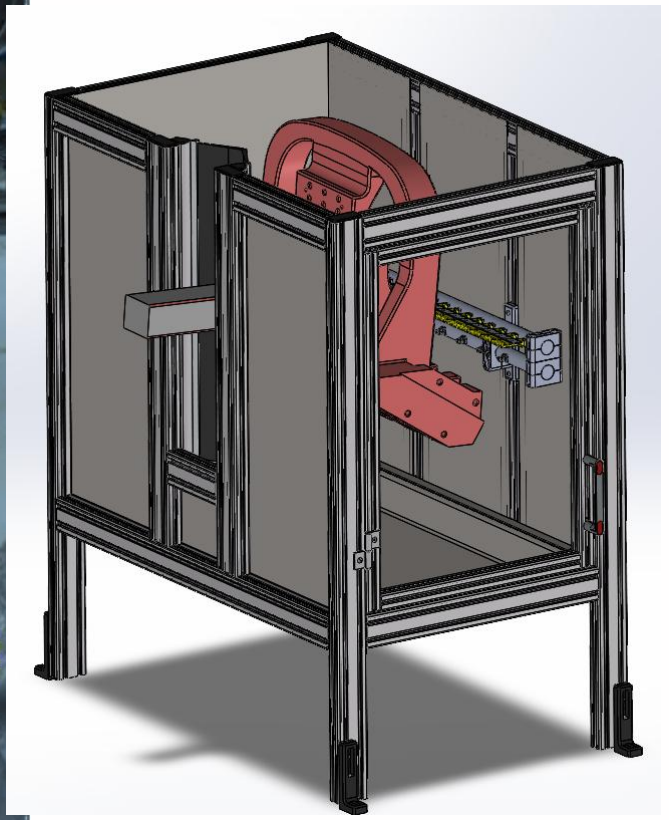
https://dictionary.cambridge.org/dictionary/english/engineering
https://www.merriam-webster.com/dictionary/engineering
https://web.mit.edu/fnl/vol/161/seering.htm

Challenge: (theses work)

Task



3D Design/Model



Ready to install

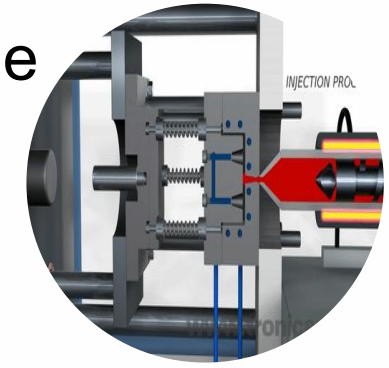
https://urn.fi/URN:NBN:fi:amk-2025071523638

Other thesis work
(read abstracts to get isnprired)

- Analys av den polära fractionen av algen Ulva med LC-MS: En studie om algens kemiska sammansättning https://urn.fi/URN:NBN:fi:amk-2025121938660
- Machine learning-driven waste sorting with robotic arms https://urn.fi/URN:NBN:fi:amk-202601281934
- Design and Structural Evaluation of an Innovative Six-Segment Collapsible Wheel for Compact Mobility Applications https://urn.fi/URN:NBN:fi:amk-2026060119821
- Experimental Study of the Cooling Efficiency of a Heat Sink under Different Fan Configurations: Effects of Fan Speed, Fan–Heat-Sink Spacing, and Fan Orientation https://urn.fi/URN:NBN:fi:amk-202602253360

Arcada Sustainability and Tech Lab

Injection molding machine



CNC Milling machine

Arcada Sustainability and Tech Lab

Coordinate measuring machine

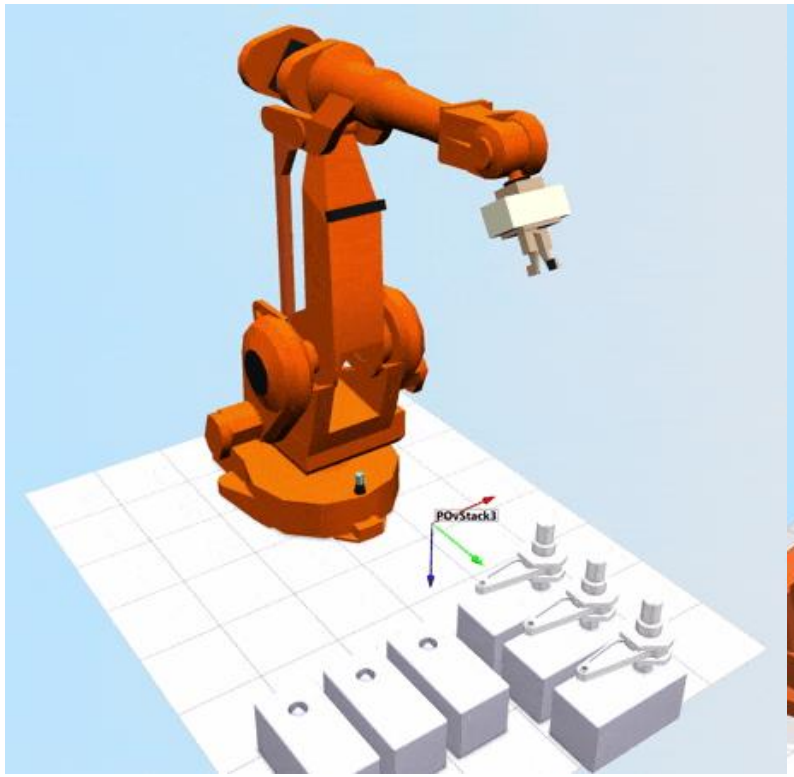
Testing in chemistry lab

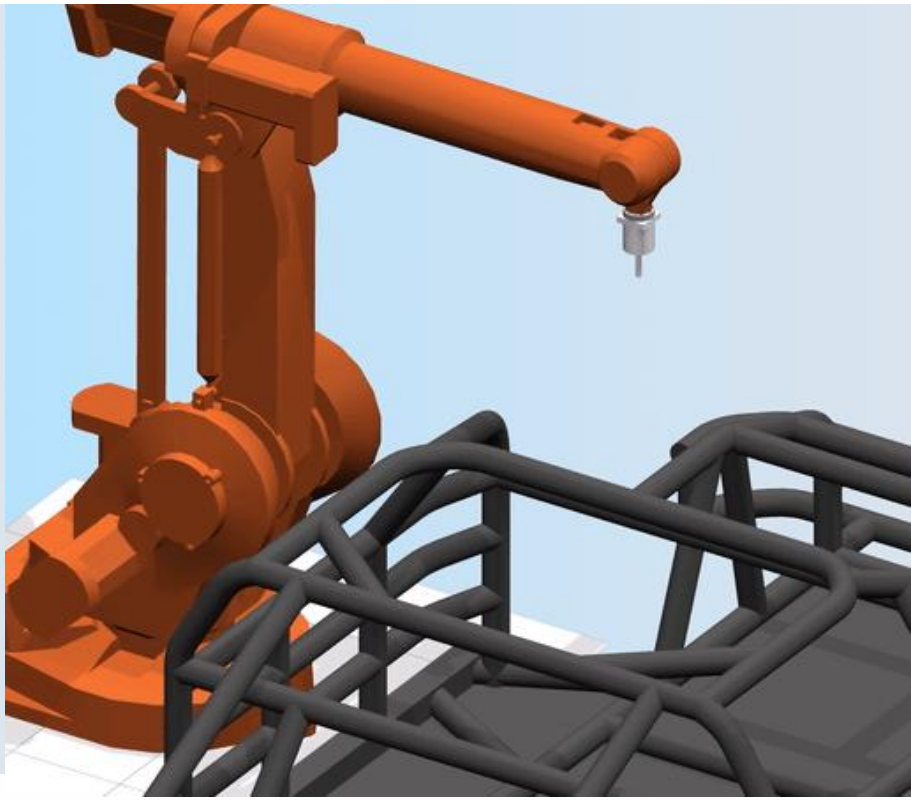
Virtual simulation experience

Programming robots - Learn to program robot (3rd year)

[ABB2400_16] ..\Programs\PickAndPlaceABB.IRL

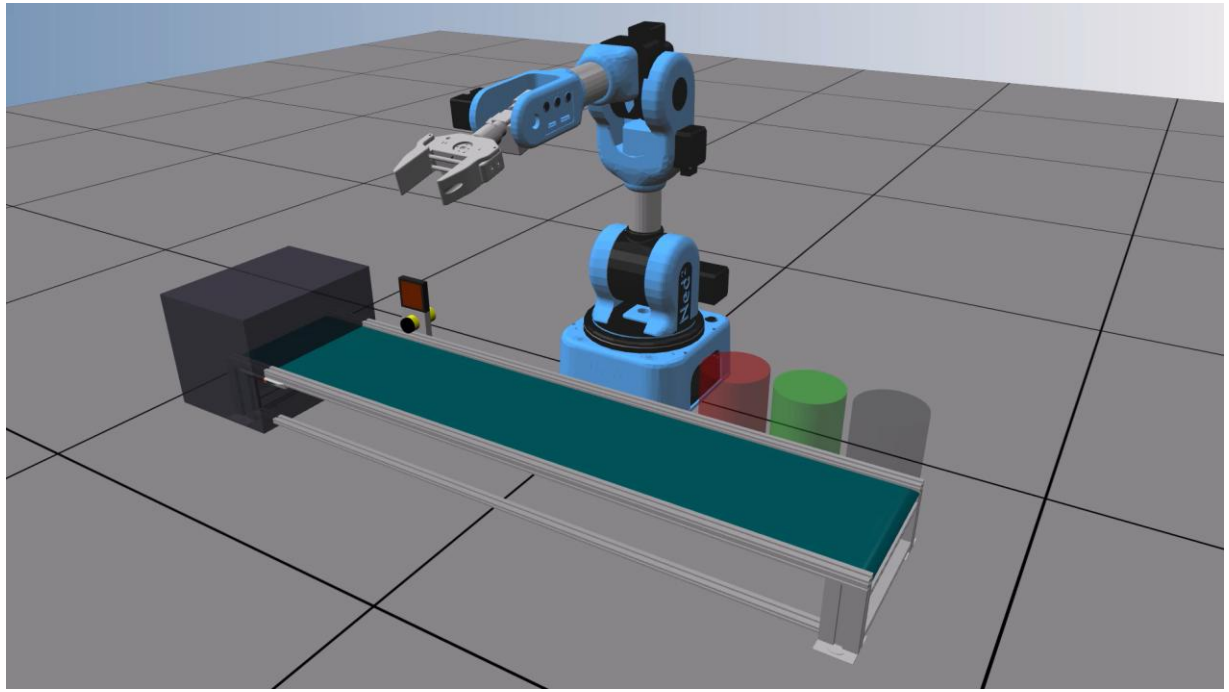
```
7
8   PROGRAM PickAndPlaceABB;
9
10  IMPORT DATALIST '..\Position Lists\PickAndPlaceABB.PSL';
11  VAR
12          TEACH ROBTARGET         :       POvStor;
13          TEACH ROBTARGET         :       PStor;
14          TEACH ROBTARGET         :       POvStack;
15          TEACH ROBTARGET         :       PStack;
16
17  VAR
18          OUTPUT BOOL     :       HCLOSE  AT 0;
19
20  BEGIN
21          {*** position above storage (PTP)}
22          MOVE PTP POvStor;
23          {*** position at storage (linear)}
24          MOVE LIN PStor;
25          {*** grip crankshaft}
26          HCLOSE := TRUE;
27          {*** position above storage (linear)}
28          MOVE LIN POvStor;
29          {*** position above stacking (linear)}
30          MOVE LIN POvStack;
31          { **** position at stacking (linear)}
32          MOVE LIN PStack;
33          {*** release crankshaft}
34          HCLOSE := FALSE;
35          { **** position above stacking (linear)}
36          MOVE LIN POvStack;
37          { **** done!!!}
38  ENDPROGRAM;
39
```



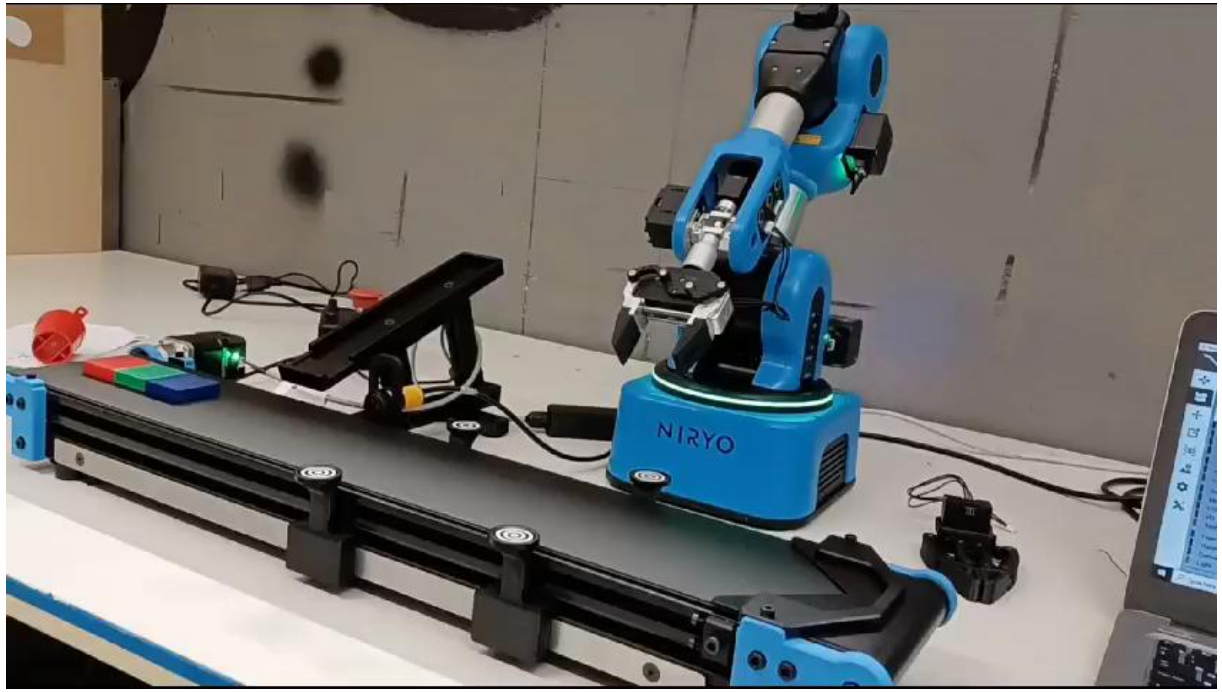


Arcada Sustainability and Tech Lab
Learn to program robot!

Digital world (Festo)

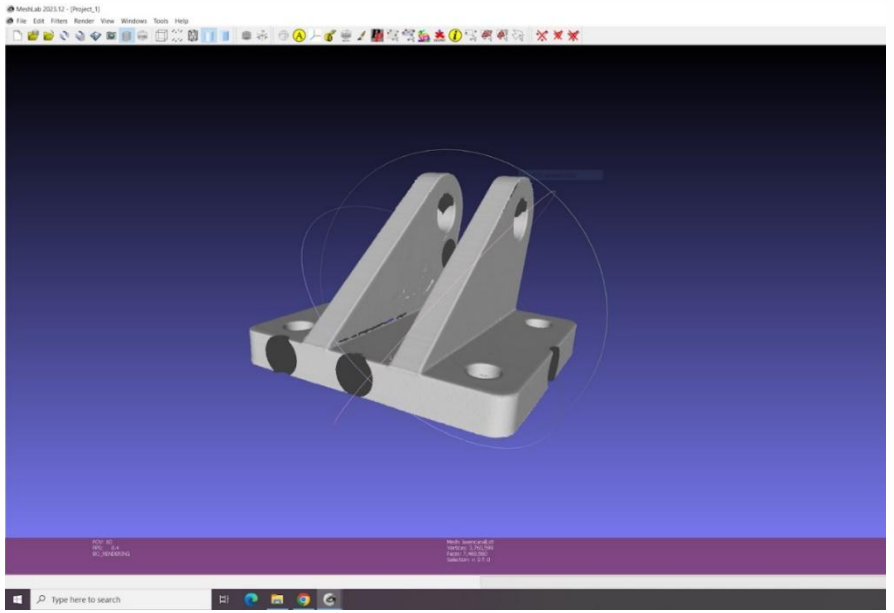


Physical world



Arcada lab

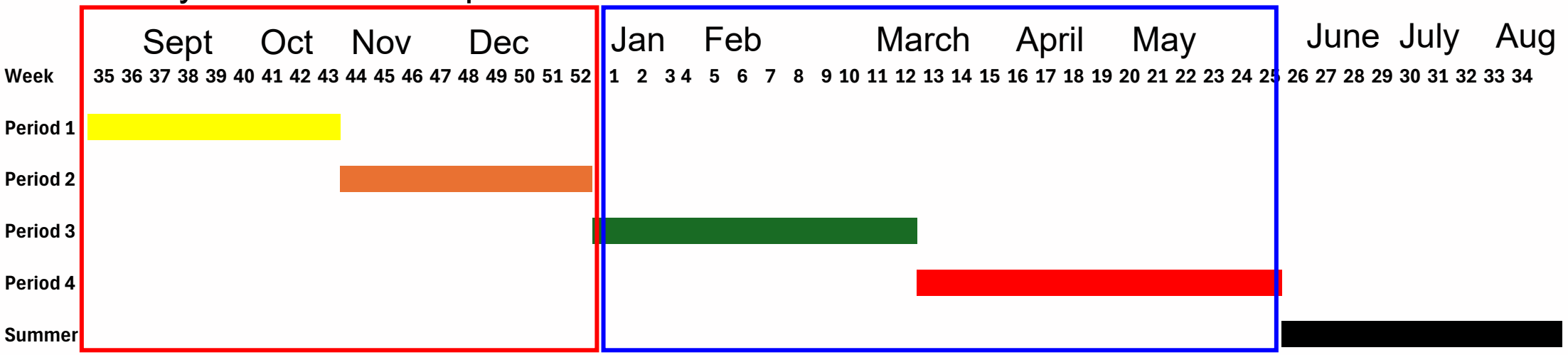
3D Printed part / physical object



3D scanning: creating 3D design from physical object

Academic year

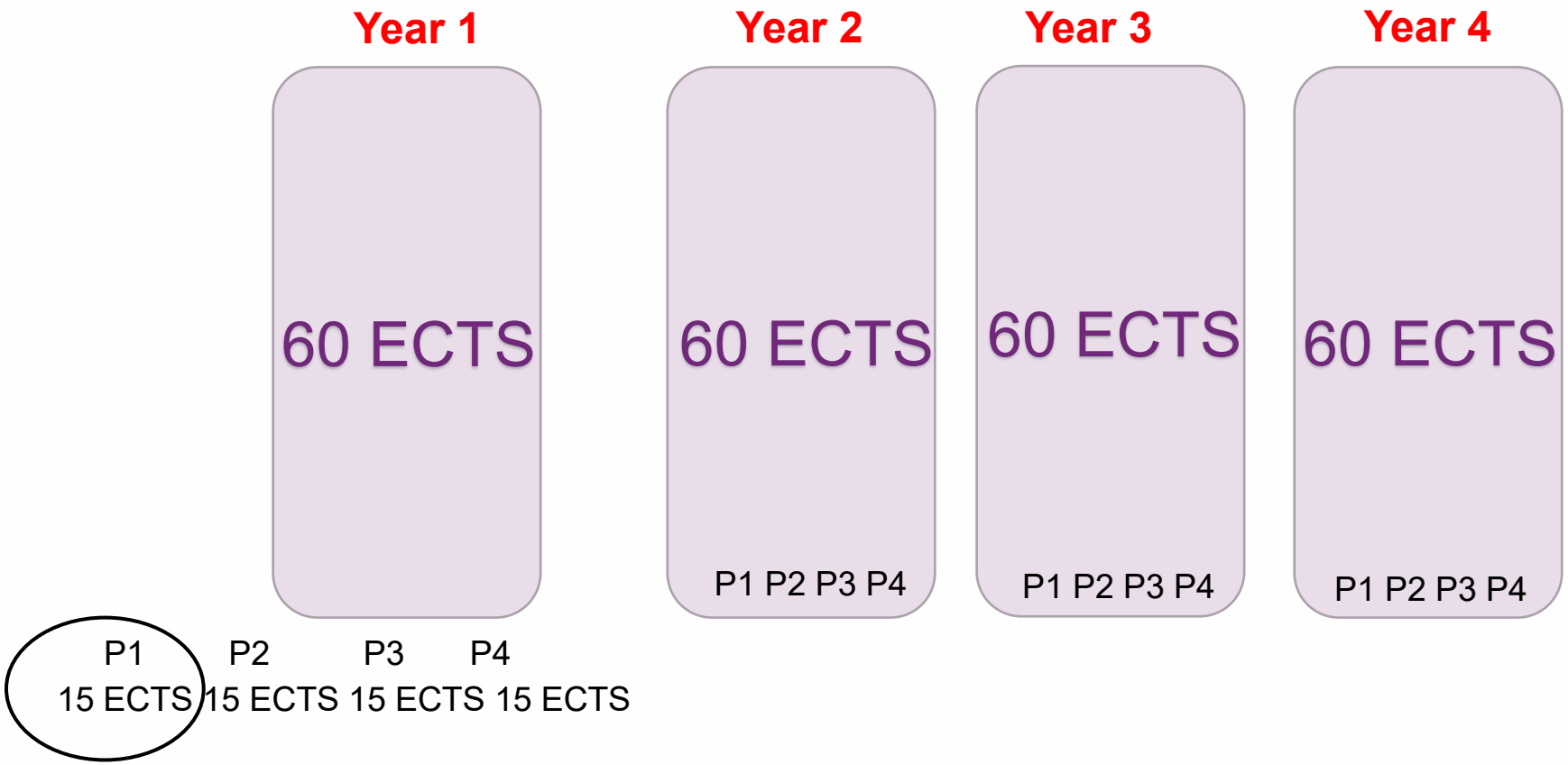
Academic year divided in 4 periods



Period 1: 1 August 2026- 25 October 2026 (tuition starts on 27 or 31 August 2026*)
Period 2: 26 October–31 December 2026
Winter break: 19 December 2026–6 January 2027 (no tuition)
Period 3: 1 January–21 March 2027
Period 4: 22 March–31 July 2027 (regular tuition ends on 28 May 2027 at the latest)

Competence-based Study Plan

Mechanical and Sustainable Engineering/ Materialteknik och hållbarhet



1 Course = 5 ECTS
12 courses / year

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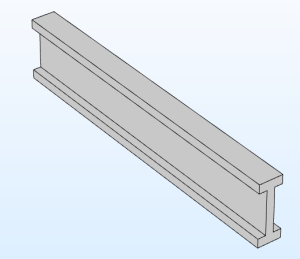
Material

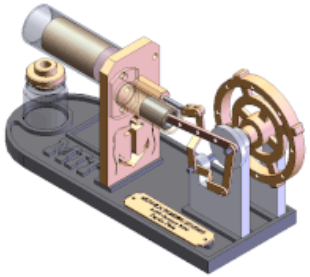
Metal powder

Raw form

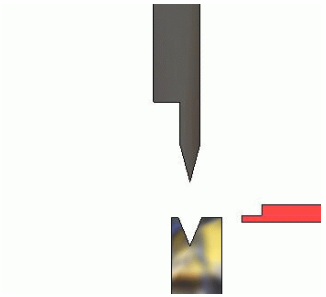
Engineering design



3D modeling

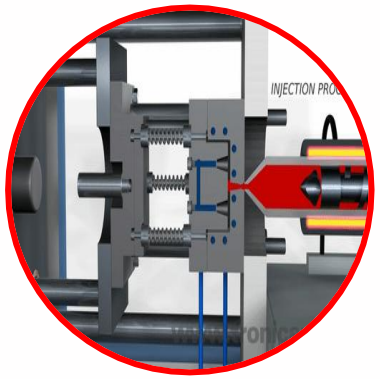


Dynamics (motion/forces)



Prediction of behavior simulation with software (FEA)

Processing



Injection molding

Machining (material removal)

Testing

Tensile testing

Life cycle assessment

Chemical, thermal, mechanical properties

Applied mathematics, physics

Basic science (physics, chemistry) and mathematics

Sustainability

Mechanical and Sustainable Engineering -- MSE 3-4 Years

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General Studies (15 ECTS)

- Technology and Learning (5 ECTS)
- Teamwork and Innovation (5 ECTS)
- Sustainable development (5 ECTS)

Professional Studies (165 ECTS)

- Basic Studies in technology (30 ECTS)
  - Mathematics 0
  - Linear Algebra
  - Differential Calculus
  - Integral Calculus
  - Engineering Chemistry
  - Engineering Physics
  - Programming-1
- Sustainable Modelling (15 ECTS)
  - Environment and resources
  - Sustainable Energy and Materials
  - Life Cycle Assessment
- Technical Modelling (15 ECTS)
  - Technical Drawing
  - Computer Aided Design
  - Programming-2
- Materials (30 ECTS)
  - Materials Chemistry
  - Manufacturing and Processing
  - Material Properties
  - Composites
  - Heat Transfer
  - Material Selection
- Engineering Design (30 ECTS)
  - Statics
  - Mechanics of Materials
  - Digital Manufacturing
  - Finite Element Method
  - Dynamics
  - Computer Aided Engineering
- Professional Communications (15 ECTS)
- Practical Training (30 ECTS)

Development Studies (30 ECTS)

- Circular Economy (15 ECTS)
  - Circular economy principles
  - Circular economy indicators
  - Circular economy Sectors
- Plastic Technology (15 ECTS)
  - Fluid Mechanics
  - Mould design
  - Processing methods and Optimization
- Advanced Materials Technology (15 ECTS)
  - Sustainable product design
  - Material analysis
  - Viscoeleasticity
- Project (15 ECTS)
- Finnish for Beginners (15 ECTS)

Research Studies (30 ECTS)

- Thesis and Methods (30 ECTS)

Engineering Design

- You will study principles of mechanical design and analysis

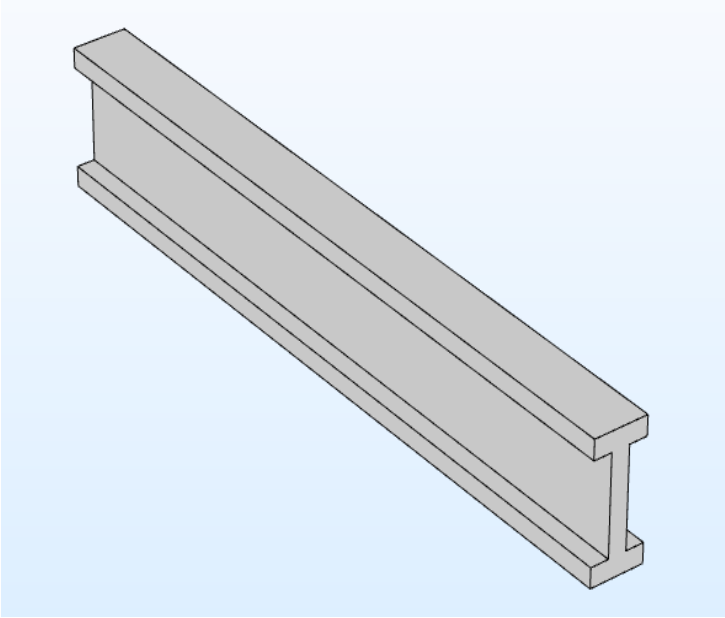
Modelling

Analyses

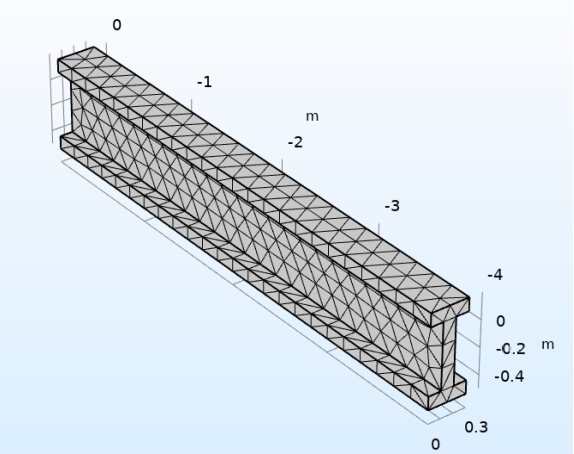
Theoretical Method

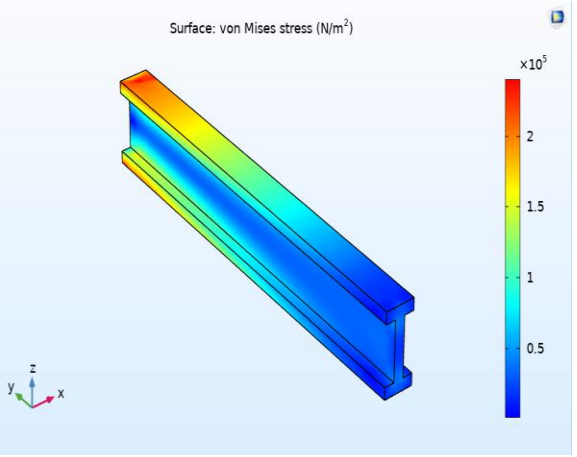
$$\frac{\partial \sigma_{ij}}{\partial x_i} + F_i = 0$$

$$\sigma_{ij} = ?$$



Finite Element Method





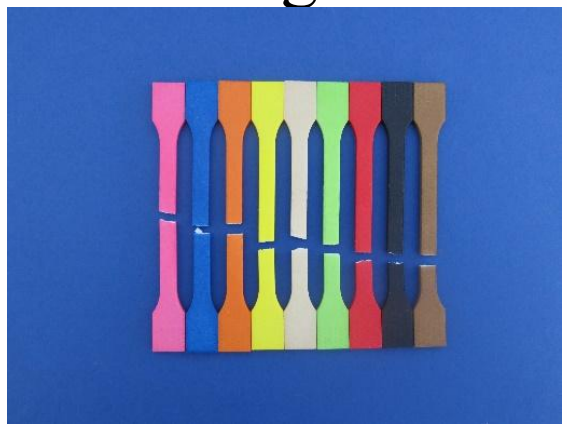
Comsol Multiphysics

Material Testing

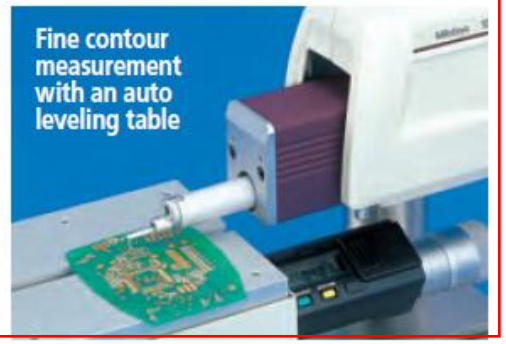
Sustainable product development involves understanding materials that requires aggressive testing and analyses before products join markets.

Sometime we break stuff on purpose, to find out how strong it is.

Mechanical Testing



Surface Roughness Analyses



Materials

- You will investigate broadly the thermal, chemical and mechanical properties of materials, and apply the knowledge to design and processing methods.

Company excursions

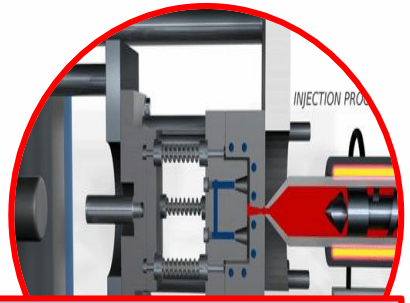
Material Analyses at Our Chemistry Lab.

Material Processing

- We teach the science behind the convectional and the state-of-the-art technologies

Additive Manufacturing Technologies

Subtractive CNC Milling



Numerically controlled injection Moulding and extrusion

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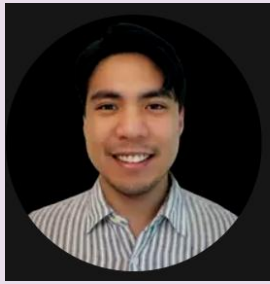
Alumni

reorbit

- Thumula Patabendige
Alumnus

Mechanical Engineer at ReOrbit
2024



ABB

- Niccolo Adriano
Alumnus, Mechanical Design Engineer at ABB

2024

Raffay Sultan
Research and Design Engineer at Woodio Oy

Madushan Chathuranga Liyanage
Mechatronics Trainee Hyperion Robotics

Franz Irjala
Plastoco Oy Ab

plastoco

Eero Wallenius
Production Specialist at Woodio Oy

woodio

Madelen Joro, 2024
Research Engineer

VTT

Robin Ehrsten
Geberit Production

GEBERIT

Career

- Graduating with Bachelor of Engineering in MSE/PM provides you competencies which enable:

  - **Employment Opportunities**
    - Sustainability Engineer
    - Design engineer
    - Material testing
    - Quality control
    - Production planning
    - Product development

  - **Further Studies (Master degree)**

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University studies

- Self-discipline
- Active learning / contact teachers
- Use calendar / diaries to make schedule
- Make sure you earn 15 ECTS per period
- Learn to use Arcada digital tools (Itslearning, outlook, Teams)

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What is pathway education?

- Online studies
  - What does it mean?
- Active learning / contact teachers
- Use calendar / diaries to make schedule
- Make sure you earn 15 ECTS till 26th October
- Learn to use Arcada digital tools (Itslearning, outlook, Teams)

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Courses in P1 and P2

- Period 1:
  - Technology and Learning
  - Engineering Chemistry
  - Introduction to programming and automation

- Period 2:
  - Teamwork and Innovation
  - Linear algebra
  - Technical Drawing

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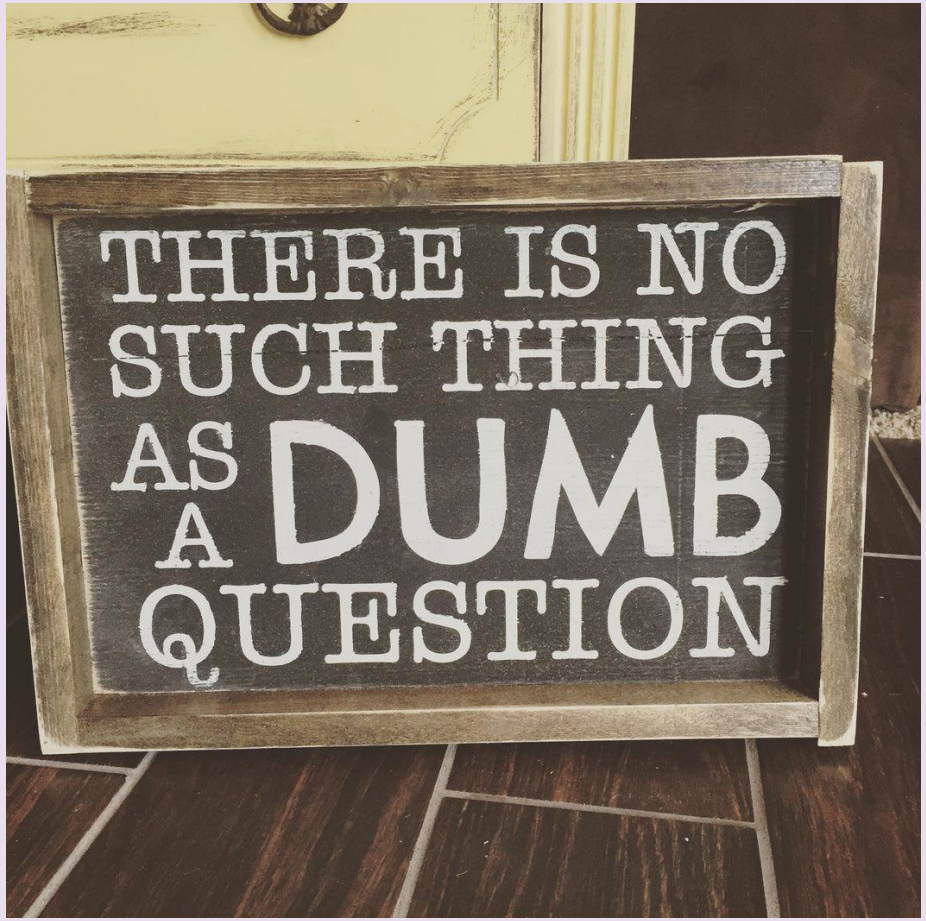
For questions,

Send email to Rizwan.ullah@arcada.fi



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Visit the Program website

https://www.arcada.fi/en/study-arcada/bachelors-degree-programmes/mechanical-and-sustainable-engineering

Good luck with your studies ahead!!!