

Online Phase:
**March-April,
2026**

On-site Week in Riga:
**April 20-24,
2026**

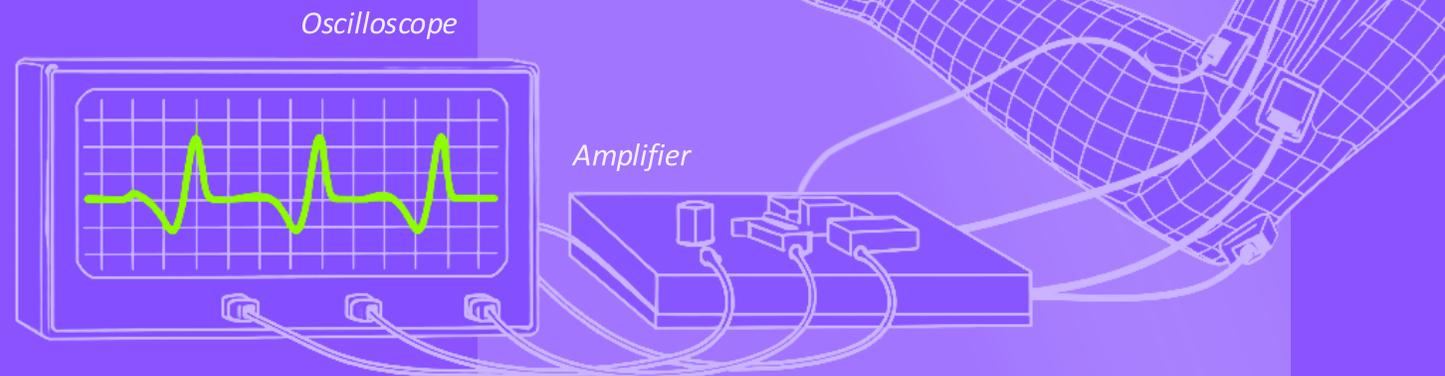
5 ECTS **BIP** Blended Intensive
Program*



Bio-Mechanical Cyber-Systems *for sustainable prosthetics and exoskeleton solutions*



EMG
Electrodes



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**Bio-Mechanical
Integration**

Bridging human autonomy
with mechanical systems.

**Digital
Fabrication**

Hands-on 3D design, CAD simulations,
and rapid prototyping.

**Advanced
Mechanics**

Design of KUKA mechanisms and
compliant structures.

Sustainable Design

Sustainable material
selection for devices.

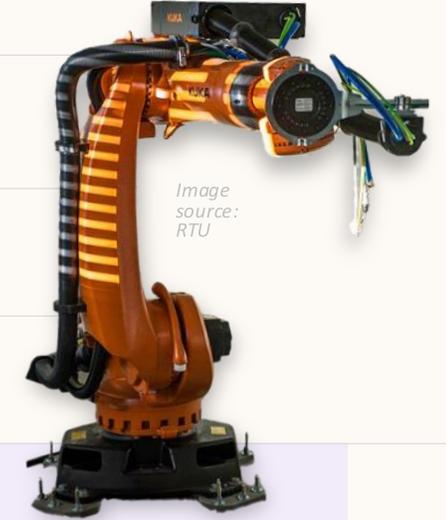


Image
source:
RTU

5 ECTS BIP Blended Intensive
Program*

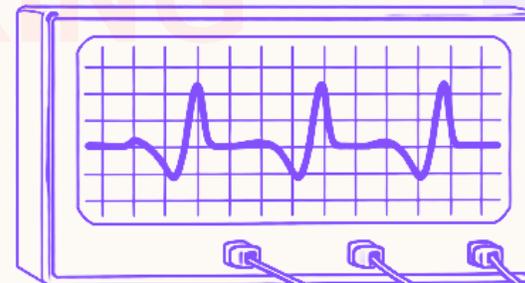
SHORT OVERVIEW

This 5 ECTS Blended Intensive Program (BIP) is initiated by Riga Technical University (RTU) and EU+ partners. It is a hands-on, challenge-based learning experience on **Bio-Mechanical Cyber-Systems** for future prosthetics and exoskeleton-related solutions, combining sensing, mechanism design, and rapid prototyping. The online preparation phase (March–April 2026) will culminate in an on-site intensive week in Riga (April 20–24, 2026), during which teams will create functional prototypes and compete across several related disciplines.

KEYWORDS:

- Sustainable Robotics
- Medical technologies
- Mechanical & Digital Solutions

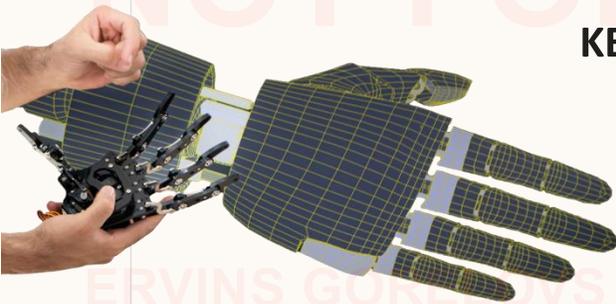
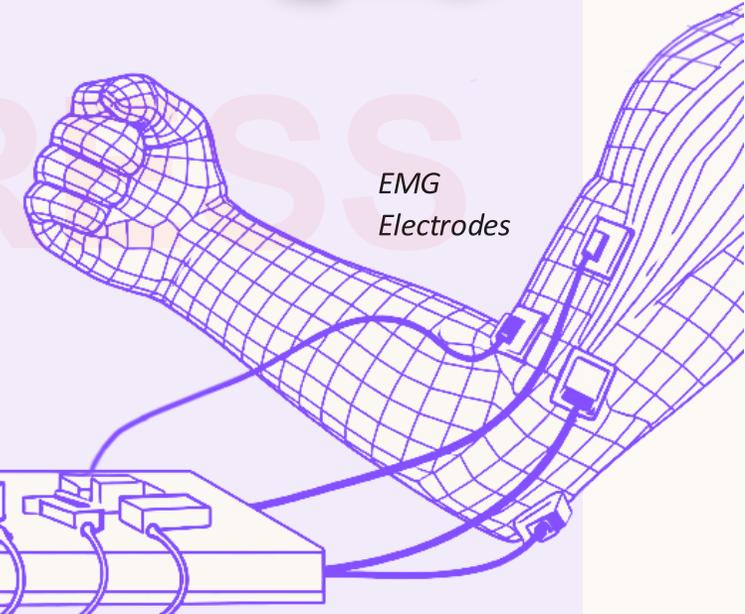
Oscilloscope



Amplifier



EMG
Electrodes



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MEMBER OF



Erasmus+

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SHORT OVERVIEW

With the rapid rise of advanced digital tools (*now also increasingly shaped by AI*), the boundaries of engineering practice and engineering education are shifting. In response, Riga Technical University (RTU), together with EU+ partner universities across Europe, is developing a new, contextual approach to engineering learning: A cross-disciplinary, challenge-based, full-semester, 30-ECTS experience under the **Technology Studies, Engineering, and Design School (TEDS)**, planned to be announced later this year.

To make the transition to this new learning format smooth and accessible, and to leverage our multicultural background and cross-disciplinary stakeholders, **we are launching a series of shorter, high-intensity learning sessions** called Blended Intensive Programs (*BIPs*). These BIPs serve as an introductory chapter for the upcoming TEDS semester, bringing students from various disciplines and interested participants into the TEDS mindset through real-world challenges, collaborative work, and hands-on prototyping.



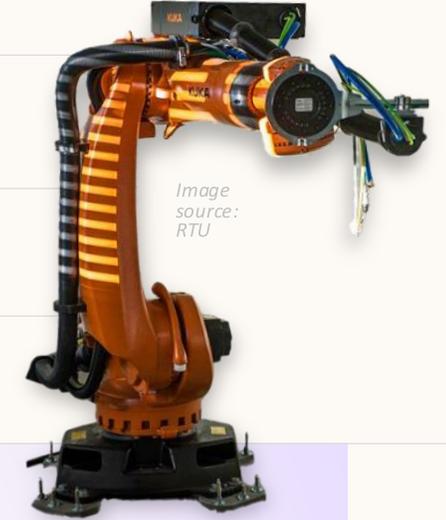
This *TEDS Lite* serves as an initial kickoff event. It is a 5 ECTS blended intensive program (*BIP*) focusing on bio-mechanical cyber-systems at the crossroads of **biomedical sensing, IT/control, CAD simulations, mechanics, and digital fabrication**, all rooted in *societal needs* and *human-centered* design.



Bachelor's and Master's students who are eligible for an Erasmus+ exchange and major in at least one of the described disciplines - are encouraged to apply! Teams of 3 to 6 members will be formed based on applicants' profiles and skills after the application period ends.



The online preparation phase (*March–April 2026*) culminates in an on-site intensive week in Riga (*April 20–24, 2026*), during which teams develop functional prototypes and demonstrate them through a final pitch and demo.



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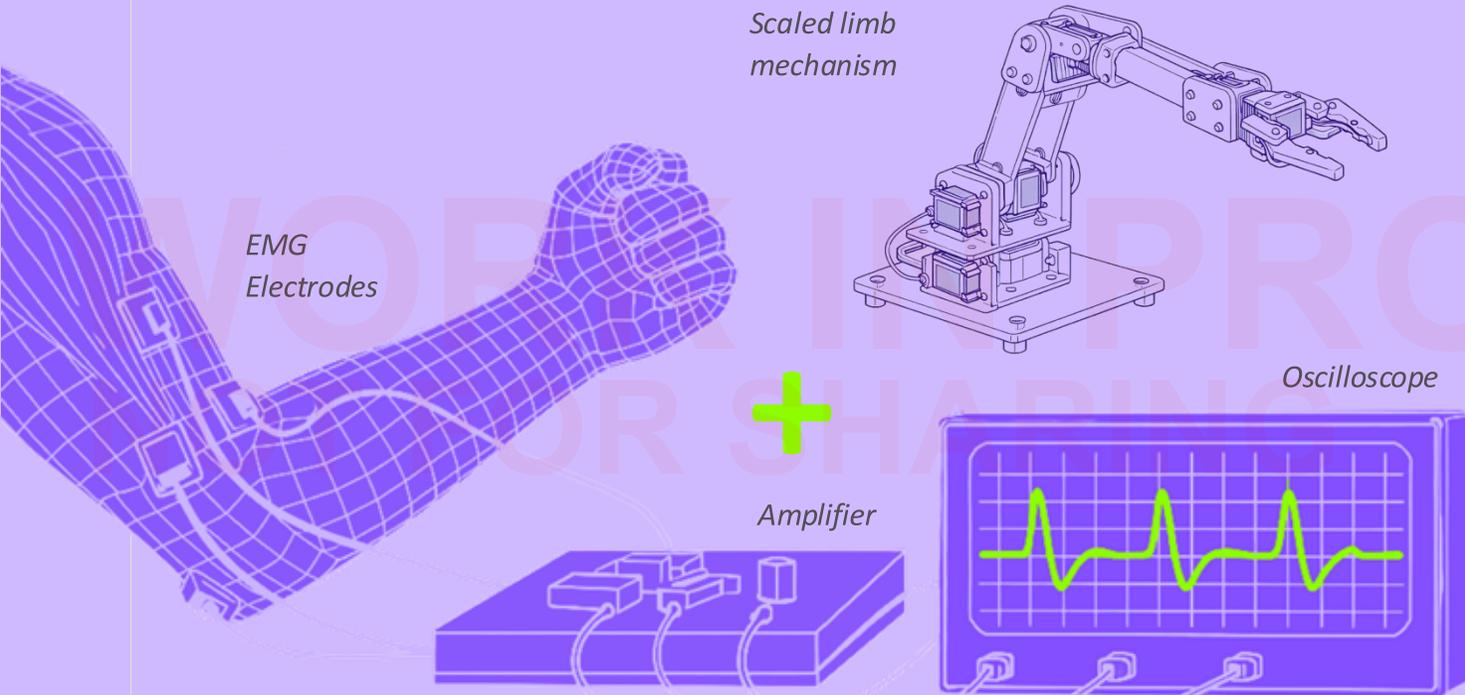


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5 ECTS BIP Blended Intensive Program*



THE CHALLENGE

Teams will design and prototype a **bio-mechanical cyber-system** that translates **human muscle activity (EMG)** into controlled mechanical movement. The goal is to build a **scaled limb mechanism (minimum 1 degree of freedom, optionally up to 3)** that can complete a defined physical task (such as moving a set of objects from point A to point B) under time and accuracy constraints.

The work combines body literacy, sensing and control, CAD-based design iteration, rapid fabrication, and responsible resource use.

The outcome will be evaluated across three criteria:

- 1. EMG placement and signal interpretation:** sensor placement quality, calibration, signal stability, and controllability.
- 2. CAD simulations and sustainability calculations:** clarity and correctness of digital design/simulation, plus material use, waste, feasibility, and basic cost/resource reasoning.
- 3. Final prototype performance:** functional reliability and task performance (*speed, precision, repeatability*) during the final demo challenge.

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Online

MAR-APR, 2026



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Erasmus+

✓ Micro-track A
Jurijs Dehtjars
& **Aleksejs Katisevs**

Clinical context, use-case framing & human muscle activity (EMG)

Clinical & User context

Introduction to user needs, safety constraints, basic terminology, stakeholders (user, clinician, technician), and what “success” means in practice.

Student outputs:

- Clinical scenario + requirements
- EMG sensor placement quality & calibration

✓ Micro-track B
Renārs Vītols

Challenge framing + design notebook

Mechanical design foundations

Students build a shared understanding of the engineering design process, define needs and constraints, and document early concepts through sketches/notes that can later be translated into CAD and prototyping tasks.

Student outputs:

- Problem statement + success criteria
- Early sketches / layout drawing + brief design notes

✓ Micro-track C
Ģints Būmanis

Sustainability & responsibility checkpoint

Sustainability

Students review sustainability trade-offs (materials, circularity, inclusiveness/accessibility) and define a “sustainability checkpoint” that the team will revisit during prototyping.

Student outputs:

- Material shortlist + short rationale (LCA mindset / circularity / sourcing)
- Inclusion/accessibility relevant to the design context

✓ Micro-track D
Ilmārs Vīksne

CAD collaboration warm-up

CAD Simulations

Students perform a brief CAD warm-up and agree on the design and physical properties simulation process.

Student outputs:

- A simple part/assembly mock-up + simulations

✓ Micro-track E
Armands Šenfēlds

Mechatronics options

Mechatronics

Students explore a minimal mechatronic concept: sensor/actuator choice and basic control logic, framed as a design option rather than a full build requirement.

Student outputs:

- A component shortlist
- A simple block diagram

On-site

APR 20-24, 2026



MEMBER OF



EUROPEAN
UNIVERSITY OF
TECHNOLOGY



Erasmus+

Monday (April 20, 2026)
 Riga

Tuesday (April 21, 2026)
 Riga

Wednesday (April 22, 2026)
 Riga + Sigulda

Thursday (April 23, 2026)
 Riga

Friday (April 24, 2026)
 Riga

Kickoff + Task definition + Team alignment

Introduction to FCME labs & BIO-day

Robotics day + Travel to Sigulda

Integration + testing loop

Showcase + reflection

Step 01 | Kick-off

Registration, welcome, safety + workshop rules, challenge briefing

Step 02

Team formation / confirmation + working agreements

Step 03

Visit to FCME labs (RTU)

Step 04

Practical workshop with EMG sensors, readings, and calibration

Step 05

A team activity that challenges and tests EMG inputs and controls

Step 06

Visit to IEEI labs (RTU)

Step 07

Practical planning (*materials, processes, parts list*)

Step 08

Visiting Sigulda
<https://cyberknife-sigulda.com/en/>

Step 09

Teambuilding & Social Activity

Step 10

Prototype iteration + testing loop

Step 11

Mechatronics integration session

Step 12

Sustainability checkpoint (*materials, circularity, accessibility, CAD deepening + design validation checks*)

Step 13 | FINAL

Final demo + pitch to academic / industry panel

Feedback

Feedback + next-step discussion + Individual and Team reflection

Let's **co-create** and see you in Riga!

*April 20-24,
2026*