

UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA

OBERÖSTERREICH

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Winter School in Medical Engineering 2027

Key Areas:
Medical Simulations, Telemonitoring, Bioprinting and Materials

8 - 12 February 2027

University of Applied Sciences Upper Austria
School of Medical Engineering and Applied Social Sciences Linz/Austria

Aim

higher

Winter School in Medical Engineering 2027

Key Areas: Medical Simulations, Telemonitoring, Bioprinting and Materials

Thanks to significant advances in technology, prostheses are no longer bulky things mainly designed to replace the shape of an absent limb. Special material technologies such as lithography can reduce the weight of a prosthesis by more than 90%. Moreover, the implementation of particular sensor technologies significantly improves the accuracy and precision of any movement. Finally, embedding easily programable microcontrollers allows a prosthesis and its wearer to realize a large variety of complex movement patterns. Nowadays, prostheses are high-tech devices which foster the independence and autonomy of their wearers, thereby significantly improving their quality of life.
However, before prostheses can be fitted and worn, a variety of simulations and tests have to be performed to ensure correct functioning. The Department of Medical Engineering and International Office of the University of Applied Sciences Upper Austria in Linz are pleased to welcome you to our annual Winter School offering you a 5-day program of lectures, workshops, laboratory and cultural activities. We sincerely hope that you enjoy your stay with us as well as find some time to discover Linz – it is the third largest city in Austria and the capital of the Province of Upper Austria.

For further information and application please visit:
www.fh-ooe.at/winter-school-mt

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Head of Department of Medical Engineering

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Head of International Office

Aim → **higher**

University of Applied Sciences Upper Austria (FH Upper Austria)



The University of Applied Sciences Upper Austria is the largest research-intensive university of applied sciences in Austria and is an integral part of the tertiary education system. The organization is defined by the requirements of regional employment and research needs. Four locations in Upper Austria´s central area offer innovative and interdisciplinary academic degrees, each with a different focus.

- School of Informatics, Communications and Media
  Hagenberg Campus
- School of Medical Engineering and Applied Social Sciences
  Linz Campus
- School of Business and Management
  Steyr Campus
- School of Engineering
  Wels Campus

You will find more information at:
www.fh-ooe.com



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School of Medical Engineering and Applied Social Sciences

The focus in Linz is Medical Engineering and Applied Social Sciences. Our aim is to prepare students for the leadership positions of the future. Because our programs are designed around a common theme, the synergy effects are obvious: more knowledge and a multitude of partner organizations, such as the Austrian Red Cross, leading charities and numerous human services organizations and companies such as Otto Bock.

All degree programs combine comprehensive training with practice.The School of Medical Engineering and Applied Social Sciences offers study programs at undergraduate (bachelor´s) and graduate (master´s) level.

Medical Engineering (BA/MA) combines medicine and medical device technology and prepares students to bridge the gap as Medical Engineers.

Human Enhancement Engineering and Ethics (BA) focuses on supporting the development, implementation, and optimization of Human-Enhancement-Methods for safe, effective, and accepted products and systems.

Social Work (BA/MA) trains students to advice and counsel people in distress and enables graduates to plan and organize the helping process.

Social-, Public- and Nonprofit-Management (BA) is a business degree program that is geared towards the realities of the social and health, the public and the non-profit sectors.

Applied Technologies for Medical Diagnostics (MA) covers a new professional area at the intersection of engineering, natural sciences and technology-oriented health professions, neatly filling the gap between development engineering and the application of medical devices.

Leading Transformation for Impact Organizations (MA) combines sustainability and digitalization with leadership and organizational change.

Managing Nonprofit and Public Services (MA) offers an industry-specific general management education with a focus on non-profit organizations and public institutions.

Preliminary Program

→ Monday, 08 February 2027

9:00	Introduction FH Upper Austria and Medical Engineering
9:15	Organizational Matters
9:45	Coffee and FH Campus Tour
11:30	Additive Manufacturing and Sample Analysis (Lectures)
12:45	Lunch Break - Sandwich Day
13:30	Additive Manufacturing and Sample Analysis (Lab Tour)
16:00	Welcome Dinner

→ Tuesday, 09 February 2027

9:00	Bioprinting (Lecture)
12:00	Lunch Break - Soup Day
13:00	Bioprinting (Workshop)

→ Wednesday, 10 February 2027

9:00	Core Facilities and Research Areas of the Center of Technological Innovation in Medicine (TIMed CENTER)
9:45	Break
10:00	Monitor your own ECG - how does it work? (Workshop)
12:30	Lunch Break - Schnitzel Day
13:30	Monitor your own ECG - how does it work? (Workshop)
15:30	Break
16:00	Guided Tour „Kepler University Clinic - 3D-Lab“

→ Thursday, 11 February 2027

9:00	Myoelectric Control of Hand-Prostheses (Lecture)
10:15	Break
10:30	Myoelectric Control of Hand-Prostheses (Laboratory)
11:30	Lunch Break - Pizza Day
12:30	Myoelectric Control of Hand-Prostheses (Laboratory)
15:00	Free afternoon

→ Friday, 12 February 2027

9:15	Meeting point at FH Upper Austria
10:00	Mission Games
11:30	Lunch at the „Golden Pub“
13:30	Ars Electronica Center (Guided Tour and Deep Space)
15:30	Good bye and free time

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Lectures and Workshops

→ Monday, 08 February 2027

Dr. Markus Axmann, Dr. Andreas Karner
University of Applied Sciences Upper Austria

Additive Manufacturing and Sample Analysis (Lecture + Lab Tour)

This interactive lecture and laboratory tour provides an overview of the advanced research infrastructure available in Linz for micro- and nanofabrication, bioengineering, and sample characterization. Participants will be guided through the laboratories and introduced to key technologies such as multiphoton lithography, fluorescence microscopy, atomic force microscopy, and advanced surface characterization methods. The lab tour also includes insights into the cell culture facilities as well as equipment for molecular protein and genome analysis.
A particular focus of the lab tour is the research conducted at the JR Centre for Materials Engineering in Soft Tissue Regeneration, where advanced biomaterials and three-dimensional cell scaffolds are being developed for applications in regenerative medicine. State-of-the-art light-based manufacturing technologies are used to create biomimetic structures that mimic the extracellular matrix and support the regeneration of soft tissues such as skeletal and smooth muscle. Advanced imaging and analytical techniques are employed to investigate cell-material interactions and characterize engineered tissue models and extracellular vesicles.

→ Tuesday, 09 February 2027

Dr. Armin Hochreiner
University of Applied Sciences Upper Austria

Bioprinting (Lecture + Workshop)

Bioprinting is currently a constantly growing area of research. The areas of application are very diverse. 3D printing in medicine - such as 3D bioprinting for tissue engineering - has huge potential. Printed structures with biological material can, for example, help to better study cell growth in the laboratory. In the future, complex organs could be printed with this modern technology. Also supporting the reduce of animal experiments is one major goal.
How can you build a simple bioprinter? This is what the Department of Medical Technology is presenting as part of the Winter School. Gain your first experience with creating and printing bioink.
As optical measurement systems playing a gaining role in 3D printing and in medicine a short excursion into optical measurement technology rounds off the program.

Lectures and Workshops

→ Wednesday, 10 February 2027

DI (FH) Thomas Kern
Director Center of Excellence, University of Applied Sciences Upper Austria

Core Facilities and Research Areas of the Center of Technological Innovation in Medicine (TIMed CENTER) (Lecture)

The Center for Technological Innovation in Medicine (TIMed Center) bundles the strengths of the four FH Upper Austria faculties in Hagenberg, Linz, Wels and Steyr, to realize a new, internationally visible main hub in the Medical Valley Upper Austria in the form of an interfaculty center for the development of interdisciplinary solutions to technical issues in the life sciences (medicine, biomedicine, biology, biochemistry, molecular biology, biophysics and bioinformatics). In addition, the TIMed Center forces a technology-centered and science-based academic education in Upper Austria.

Dr. Robert Merwa
University of Applied Sciences Upper Austria

Monitor your own ECG - how does it work? (Lecture + Workshop)

The human heart is a complex, hollow, muscular organ about the size of a fist that beats rhythmically up to 100,000 times a day and thereby supplies our body with vital oxygen and nutrients. The activity of the heart muscle is measured using electrodes on the body - this is called an electrocardiogram (ECG). The analysis of the ECG is indispensable for monitoring and controlling the state of health, for the early diagnosis of diseases, and for the performance diagnosis of athletes. For telemedical monitoring, modern ECG devices are equipped with WiFi modules so that data can be transmitted and evaluated in real time.
The first part of the workshop includes a short introduction to the structure of the heart and an overview of current measurement methods. The hardware of a programmable portable ECG module, which is used to record and forward the ECG signal, is also explained.
In the practical part, this portable ECG module is programmed to record ECG data using electrodes on the body and forward it via WiFi.
The ECG data can then be received on a PC using a special module and displayed in real time on the monitor.

Lectures and Workshops

→ Thursday, 11 February 2027

Dr. Andreas Schrempf
University of Applied Sciences Upper Austria

Myoelectric Control of Hand-Prostheses (Lecture + Workshop)

Within this course students will learn to implement a control strategy for a hand prosthesis by means of forearm muscle contractions. In the lecture the basic principles will be discussed and then in turn realized in the laboratory. The implementation of the control strategy will be programmed in C and tested first with the help of Matlab/Simulink. Once the control algorithm works as expected, the implementation will be transferred to the hardware, where students can test their implemented control strategy with their own EMG-signals to operate a real hand prosthesis. The learning outcome of that course includes the following topics: basic filtering techniques for EMG signals, implementation of a control strategy in C by means of a state machine, testing in Matlab/Simulink, transferring a C code to a target hardware platform, acquiring EMG-signals from the forearm, controlling a real hand prosthesis.

Guided Tour

→ Wednesday, 10 February 2027

Jürgen Schwarzbauer, Drazen Novakovic-Wagner, BSc
Kepler University Clinic, 3D Lab

3D Printing in Medical Applications



Explore various applications of 3D Printing in Medicine. Students will have the opportunity to visit the Kepler University Clinic's 3D Lab, showcasing the latest advancements in 3D printing materials and technologies. Topics will include the design and production of patient-specific anatomical models, surgical guides and biocompatible implants. Students will get insight in 3D scanning and modeling processes and printing models using state-of-the-art resin and FDM Printers.

Social Day - Adventure and Technics

→ Friday, 12 February 2027

Mission Games

MISSION is a completely new adventure that presents you with entertaining and exciting challenges in 20 different rooms. You can move around freely in the 700 m2 facility and try out every room. Skill, combination skills, speed, team spirit and other talents will help you to complete these adventures and collect as many points as possible.

Ars Electronica Center & Deep Space



The topics at the Ars Electronica Center range from artificial intelligence and neuro-bionics to autonomous systems and robotics, genetic engineering and biotechnology as well as the profound global changes of our time.
DEEP SPACE is an immersive space, created to provide unique experiences: A 16-by-9-meter wall projection, an equally large floor projection, laser tracking and 3D animations make the Deep Space something very special. Here, image worlds are projected in 4K or 8K resolution and raised to a completely new, unprecedented level.