



Master your Master: MSc Biomedical Engineering

Dr. Christian Frei
Coordinator MSc BME
05. November 2024

MSc Biomedical Engineering (BME)

- A specialized Master hosted by four departments of ETH Zurich:
 - D-ITET (leading house)
 - D-HEST
 - D-MAVT
 - D-PHYS



Christian Frei
Coordinator MSc BME

ETH zürich

**BIOMEDICAL
ENGINEERING**



MSc Biomedical Engineering: An interdisciplinary Master program

- Our mission: Highest quality of research and education at the interfaces of engineering, biology and medicine

BSc degrees that qualify for application:

BSc Electrical Engineering

BSc Mechanical Engineering

BSc Physics

BSc Computer Science

BSc Mathematics

BSc Materials Science

BSc Biology*

BSc Medicine*

BSc Chemistry*

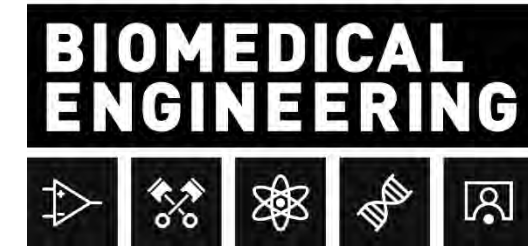
BSc Health Sciences & Technology*

*: does not qualify for all tracks (see below)

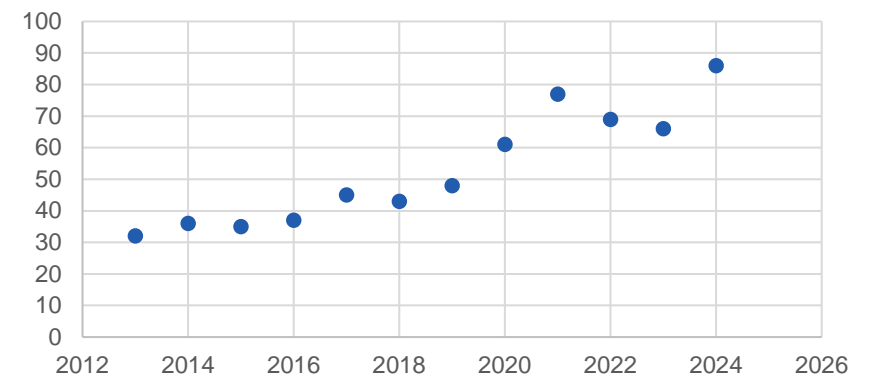
MSc Biomedical Engineering: Five tracks

- Bioelectronics
 - Bioimaging
 - Biomechanics
 - Medical Physics
 - Molecular Bioengineering
-
- Ø 2013-2024: 53 new students/year
 - Ø 2013-2024: 54.8% CH-Bachelors

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Number enrolled students per year

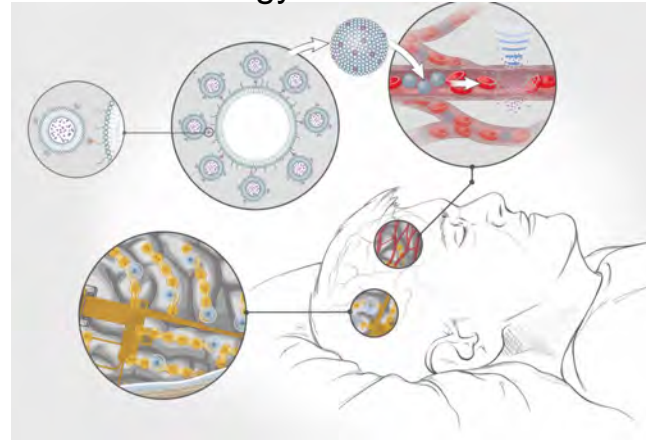


Track Bioelectronics

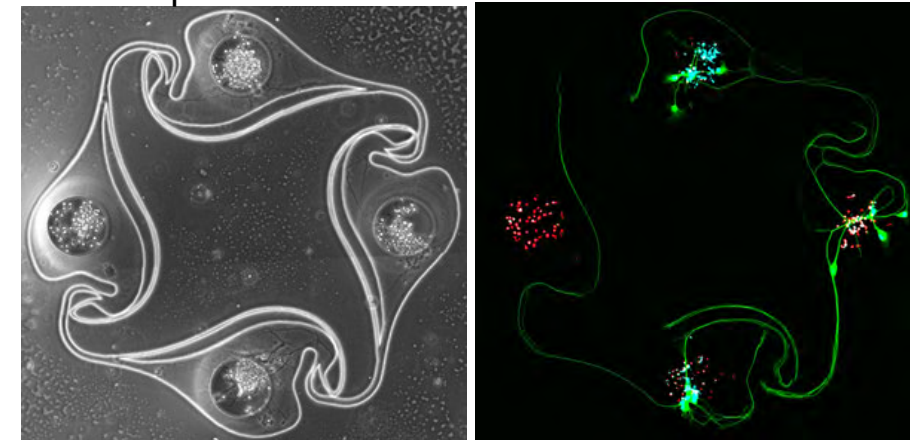
- Track advisors:
 - Taekwang Jang
 - Janos Vörös
 - Hua Wang
 - Mehmet Fatih Yanik



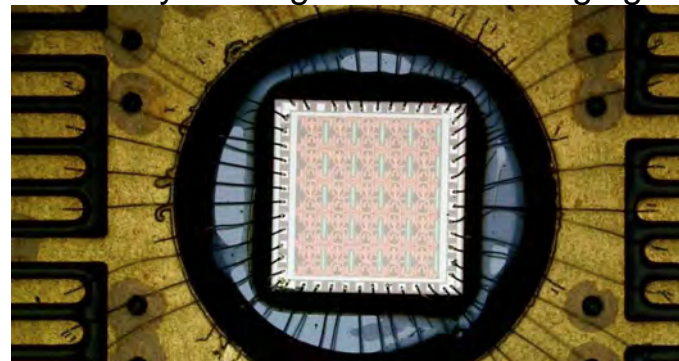
Neurotechnology



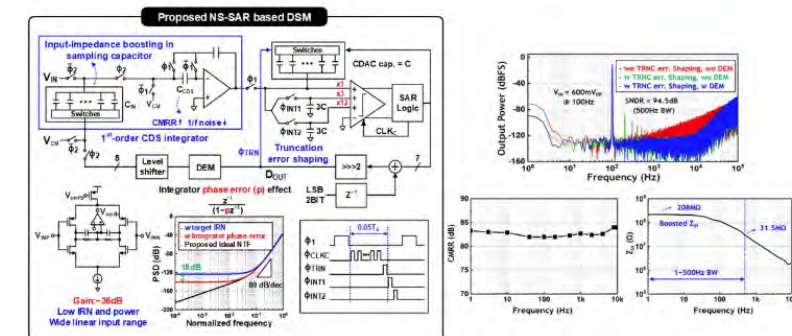
Bottom-up neurosciences



THz Arrays for high resolution imaging/sensing



Analog and mixed-signal interfaces

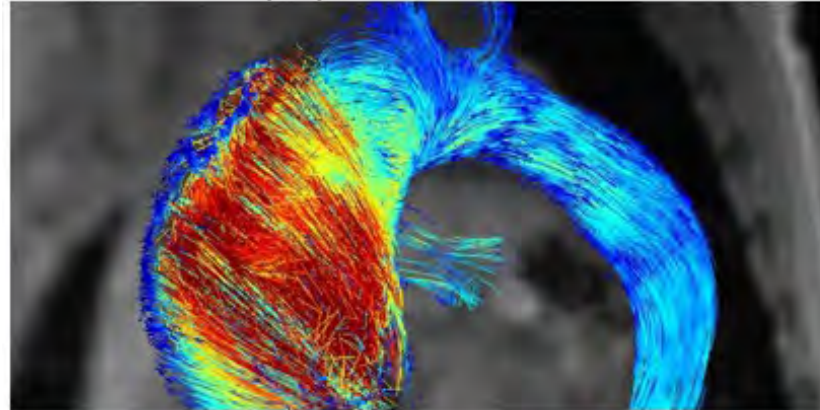


Track Bioimaging

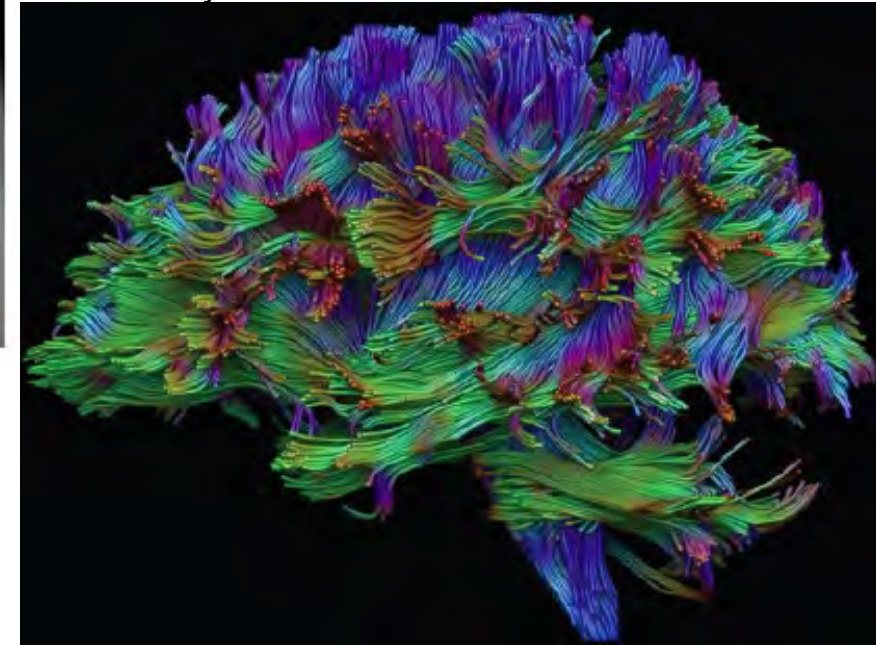
- Track advisor:
 - Klaas Prüssmann



Biomedical imaging



Connectivity in the brain



MRI technology

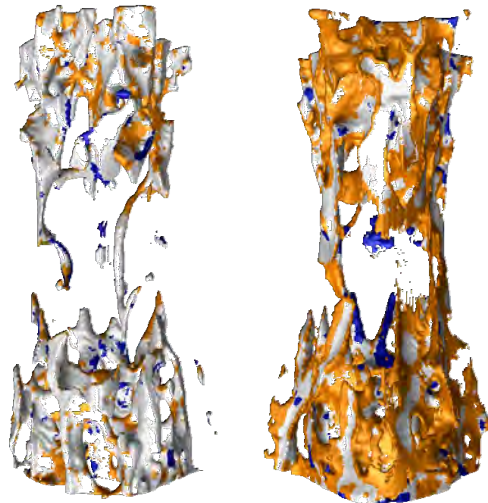


Track Biomechanics

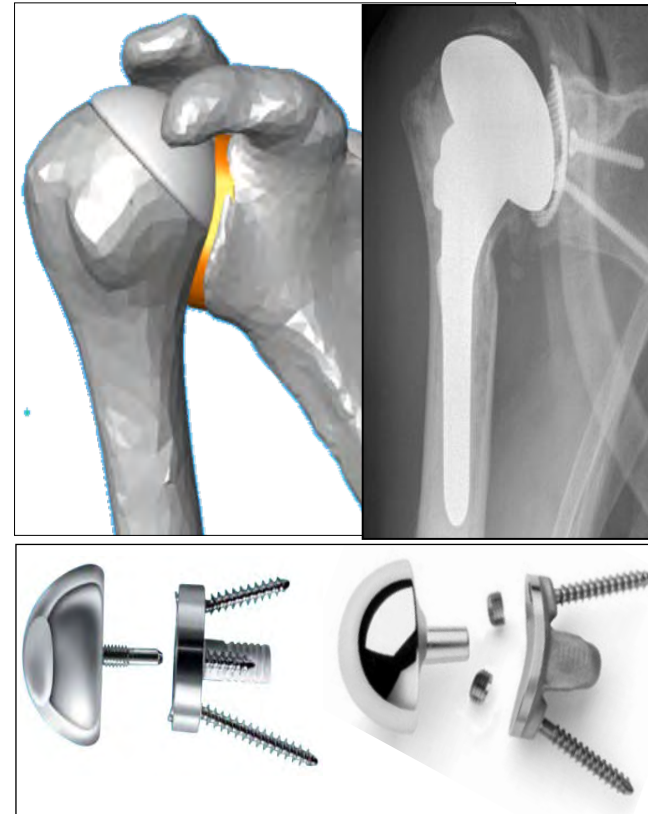
- Track advisor:
 - Ralph Müller



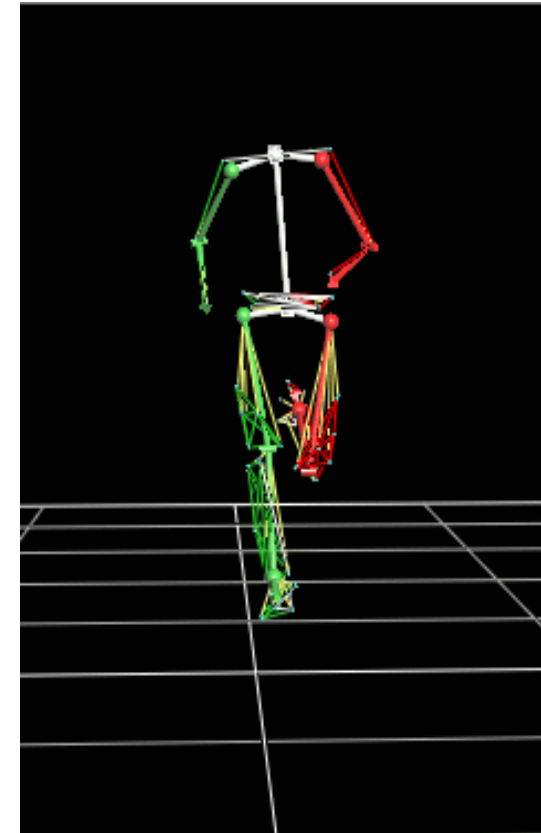
Bone biomechanics



Orthopaedic biomechanics



Movement biomechanics

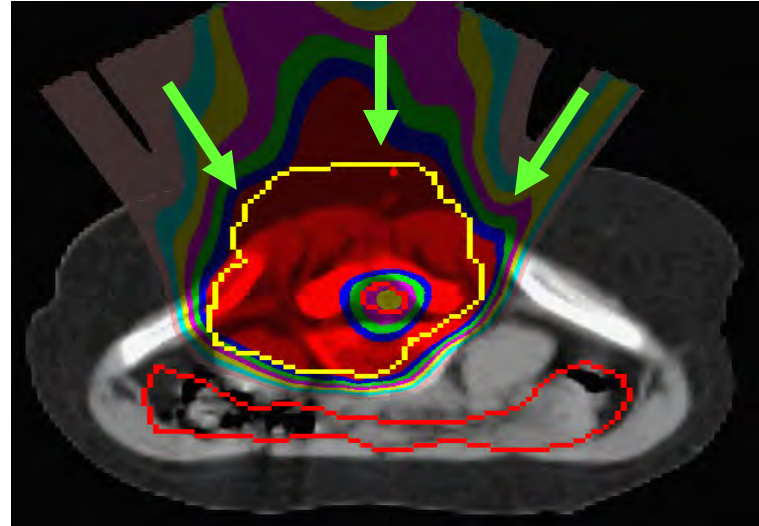


Track Medical Physics

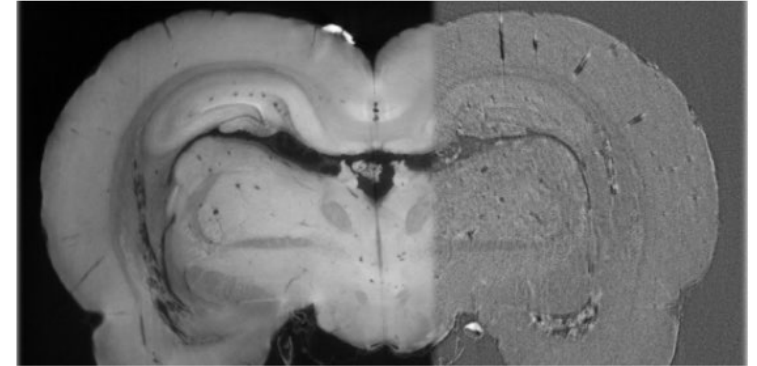
- Track advisors:
 - Tony Lomax
 - Marco Stampanoni



Radiation therapy



X-ray imaging



Paul Scherrer Institute, Villigen

Track Molecular Bioengineering

- Track advisors:
 - Mark Tibbitt
 - Marcy Zenobi



BioFabrication

- 2-Photon Polymerization
- Electrospinning
- Bioprinting

Therapeutic Approach

- Inflammatory Pathway Knockdown
- Oxygen Tension
- Drug Delivery

TISSUE REGENERATION

Cells for Regeneration

- Chondroprogenitors
- Mesenchymal Stem Cells
- Chondrogenic Reporters
- Neural Stem Cells

BioMaterials

- ECM Scaffolds
- QuickStick Adhesion
- Sulfated Biopolymers
- Neuron Hydrogels

How to enter our program

- Application through the Rectorate ([Admission's office](#))
- Application for one particular track
- Application windows:
 - November 1 - November 30 (all students, including Excellence Fellowship)
 - April 1 - April 30 (Bachelor from Swiss universities only)
- Start of the MSc: Autumn semester 2025

- Documents required (ETH/EPFL students):
 - Bachelor degree (the same rules apply as in your consecutive BSc)
 - Transcripts, motivation letter, CV, GRE (Graduate Record Examinations; suggested)
 - 2 letters of reference (ETH/EPFL-Bachelors are exempt)
 - Note: Holders of a Swiss matriculation certificate (Matura) and/or an ETH/EPFL Bachelor:
No English language certificate required

BSc degrees that qualify for application

- BSc degrees for all tracks
 - Electrical Engineering
 - Mechanical Engineering
 - Physics
 - Material Science
 - Computer Science
 - Mathematics
 - Chemical Engineering
 - Biotechnology
 - Computational Science and Engineering
 - Biomedical Engineering
- Additional BSc degrees for Biomechanics
 - Health Sciences and Technology
 - Human Movement Sciences
 - Life Sciences and Technology
- Additional BSc degrees for Medical Physics
 - Biology
 - Chemistry
 - Health Sciences and Technology
 - Life Sciences and Technology
 - Medicine
- Additional BSc degrees for Mol. Bioengineering
 - Biology
 - Chemistry
 - Health Sciences and Technology
 - Human Movement Sciences
 - Life Sciences and Technology
 - Medicine
- Note:
 - These lists are not restrictive
 - Minimal requirements if mathematics/physics

How to enter our program

- Selection committee (about 5 members): Evaluation of all applications
- Positive evaluation: Admission to one particular track

MSc Biomedical Engineering is a 120 CP Master

- a. Specialization Courses min. 52 credits
 - Core courses of specialization (min. 12 cp)
 - Elective courses of specialization (-- cp)
 - Biology courses (-- cp)



Learning agreement with track advisor
Note: Track advisor can approve courses from other tracks/other programs

- b. Projects and Practicals min. 12 credits
 - Semester project (min. 12 cp)
 - Group- and research projects (6, 12, 18 or 24 cp)
 - Internship in industry (12 cp)

- c. Science in Perspective (D-GESS) min. 2 credits

- d. Master Thesis 30 credits

• Sum of a./b./c./d: 96 credits. The remaining 24 cp can be obtained from categories a. and/or b.

The screenshot shows the website for the Masters in Biomedical Engineering at ETH Zurich. The header includes the ETH Zurich logo, the department name 'Department of Information Technology and Electrical Engineering', and navigation links for 'Student portal', 'Alumni association', 'Login', 'Contact', and 'en'. A search bar and a 'Departments' dropdown menu are also present. The main navigation menu includes 'Education', 'Research', 'Admission', 'People', 'Documents', 'News & Events', and 'Links'. A breadcrumb trail indicates the current location: 'ETH Zurich > D-ITET > Masters in Biomedical Engineering'. The main content area features a video player with a green-tinted image of 3D-printed fluorescent tubes. The video title is 'Molecular Bioengineering' and the subtitle is '3D-printed fluorescent tubes'. To the right of the video, a text box describes Biomedical Engineering as an exciting and growing field at the interfaces of engineering, biology, and medicine, with the goal of solving human health problems through advances in diagnosis, treatment, and prevention of human disease.



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<https://master-biomed.ethz.ch/>