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UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

Research Core Facilities

At the faculty of Science and Medicine

Core facility day 2025

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Foreword

Encouraging collaboration across traditional disciplinary boundaries enables students and researchers to examine familiar problems from new perspectives. This broadens understanding, challenges assumptions and often sparks ideas that would be unattainable within a single field.

However, venturing outside one's area of expertise involves navigating unfamiliar yet essential technologies. Therefore, a well-structured framework is key to guarantee equitable access, provide expert guidance and deliver comprehensive training, ensuring the effective use of advanced instrumentation beyond individual specialisation while maintaining the highest standards of scientific rigour and reproducibility. Such support empowers researchers to confidently explore and utilise critical technologies for tackling complex scientific challenges.

The Research Core Facilities at the University of Fribourg embody this commitment to rigour and efficiency. They provide researchers with reliable access to well-maintained, state-of-the-art instruments and expert support, ensuring that each experiment is performed with precision. By centralising advanced equipment and expertise, they enable optimal usage that individual labs alone could rarely achieve, thereby boosting productivity and fostering knowledge exchange across disciplines and career stages.

This shared infrastructure removes technical obstacles and promotes the maximum utilisation of costly resources. It enables scientists to conduct high-quality experiments, maintain consistent standards and access technical advice, all of which are essential in academia's frequently budget-restricted environments. They constitute therefore a solid foundation for producing reproducible, impactful research with integrity.

The increasing demand for our core facilities reflects the growing recognition among researchers that sound scientific practice and access to expertly managed instrumentation are vital. In today's environment, where compromising scientific rigour is not an option, effective collaboration and shared resources are essential for advancing knowledge and maintaining research excellence.

Prof. Dr Michael Walch
Dean

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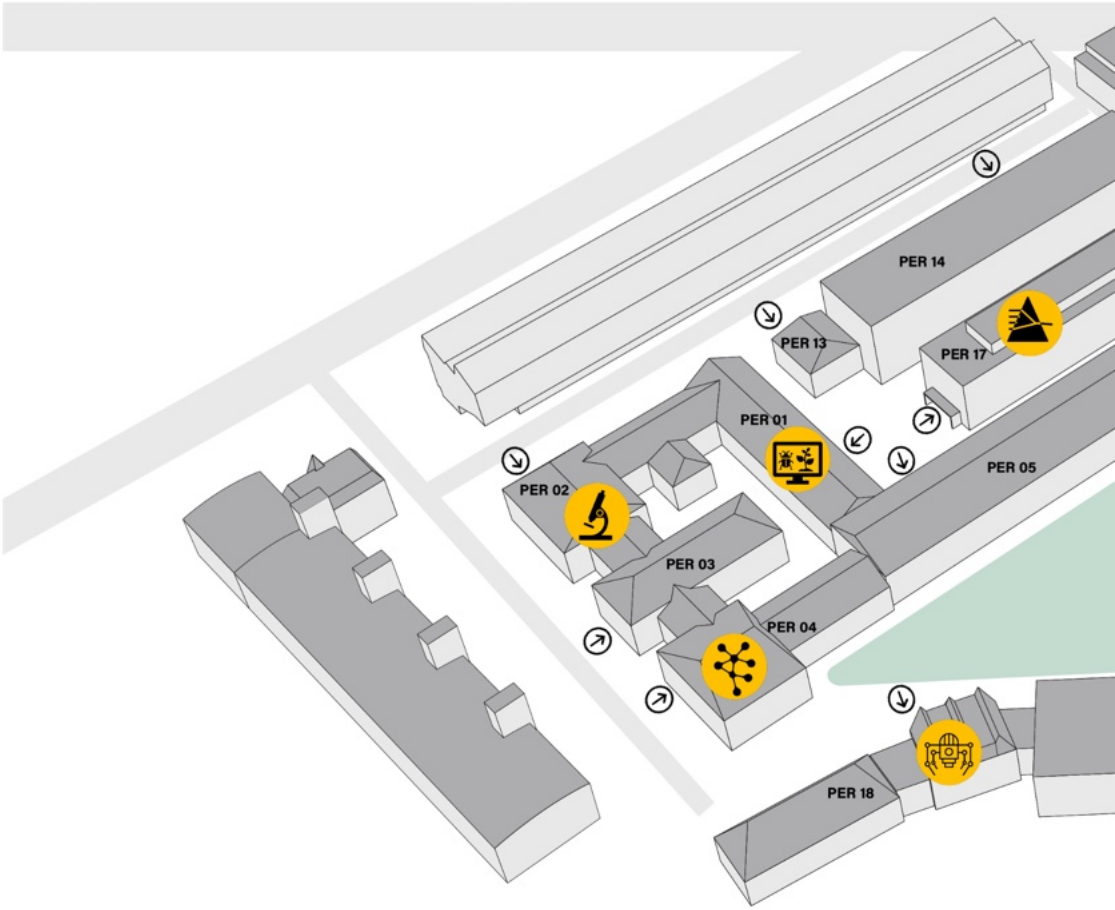
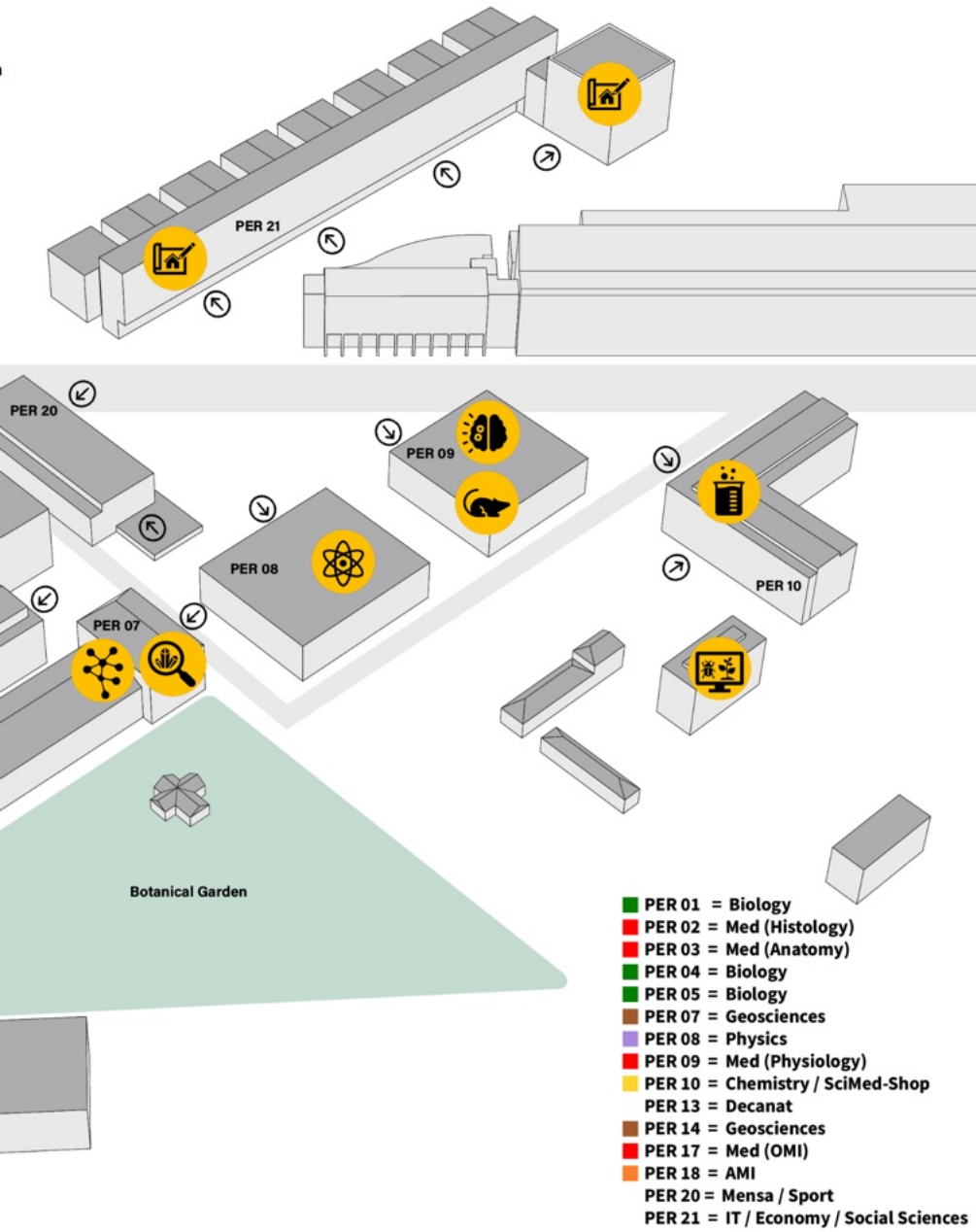
https://www.unifr.ch/scimed/facilities/

Map of the core facilities on campus

- AMI nano-characterization platform
- GeoImage & Analytics Core Facility
- Brain Imaging and Stimulation platform (BIS)
- MAPP platform (metabolomics & proteomics)
- Chemistry platform
- BioImage Core Facility (BICORE)
- Learninglab Fablab
- Cell Analytics Facility (CAF)
- Bioinformatics & Biostatistics
- Physics scattering platform
- Mouse phenotyping platform




PER 21
PER 20
PER 09
PER 08
PER 10
PER 07
Botanical Garden
PER 01 = Biology
PER 02 = Med (Histology)
PER 03 = Med (Anatomy)
PER 04 = Biology
PER 05 = Biology
PER 07 = Geosciences
PER 08 = Physics
PER 09 = Med (Physiology)
PER 10 = Chemistry / SciMed-Shop
PER 13 = Decanat
PER 14 = Geosciences
PER 17 = Med (OMI)
PER 18 = AMI
PER 20 = Mensa / Sport
PER 21 = IT / Economy / Social Sciences

How to get access

Who can access the core facilities?
All research groups of the University of Fribourg, including affiliated institutes, are allowed access the facility infrastructure. Furthermore, the services are available to external researchers from other academic institutions as well as to representatives of industry. Requests for access should be directed to the responsible facility via the contact email provided.

How to use the core facilities?
First-time facility users, as well as researchers who are uncertain about the most suitable instrument for their project, are strongly encouraged to contact admin directly via email. In consultation with our specialists, the most appropriate instrument can be identified, taking into account the origin and type of the sample, the necessary preparation procedures (if applicable), specific measurement requirements, and the structural features of interest to be analysed. This preliminary exchange ensures efficient planning, optimal use of resources, and reliable results tailored to each research objective.

How to book instruments

Unless explicitly specified, access to our facilities is coordinated through the openiris.io booking platform.

https://openiris.io/

Brain Imaging and Stimulation Platform (BIS)

Make images of your brain in activity

The BIS is a platform for brain and cognition researchers, providing the equipment and expertise for conducting high-quality basic and clinical research. The BIS team supports researchers on all steps of their scientific projects, from study design and set-up, to data acquisition, preprocessing and statistical analyses.

How to get access / how to book

Researchers interested in accessing to the platform can send us an email to briefly explain their experiments. We will assess whether and how we can best help you based on need for technical support, equipment availability, safety issues, etc.
The fees represent the direct costs of the equipment and staff. The exact price will be determined based on your demand and in accordance with the specific needs of the project.

Who we are

We are members of the FND lab and Laboratory for Neurorehabilitation Science (LNS). We offer access to our equipment and expertise according to our availability.

What we do

- Transcranial magnetic stimulation (TMS)
- Transcranial direct current stimulation (tDCS)
- Electrical Neuroimaging (EEG)
- Eye-tracking / head-tracking
- Functional and Structural magnetic resonance imaging (MRI)
- Psychophysics

Examples of research questions

1. Determine which brain networks are activated during the cognitive inhibition process.

2. Study the brain structures of patients who suffer from neurological pathologies.

3. Quantify brain frequencies in patients with chronic pain.

Location

Per. 09 BIS Platform
Chemin du Musée 5
t1700 Fribourg

Contact

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selma.aybek@unifr.ch
lucas.spierer@unifr.ch

https://www.unifr.ch/scimed/facilities/en/facilities/bis/

Cell Analytics Facility (CAF)

From Single Cells to Infinite Possibilities.

The Cell Analytics Facility (CAF) is a technological platform providing advanced flow cytometry services, expert guidance in project design, and support in data analysis. It also offers access to several complementary technologies to flow cytometry.

Flow cytometry is a powerful and versatile technique for analysing cellular functions rapidly, with precision, and enables the isolation of specific cell types for research or clinical use.

At the CAF, we provide access to cutting-edge flow cytometry instruments, along with expert support and training. Our mission is to guide you through every step of the process—from experimental design to data analysis—ensuring your success at every stage.

Our services are available to all research groups at the University of Fribourg, affiliated institutes and external academic and industry partners (upon registration). Whether you have questions, need guidance, or are ready to start a new project, we're here to help! Reach out to us with your ideas or specific needs.

What we do

- **Access to a range of flow cytometers -** including both conventional and full spectrum systems.
- **Hands-on training and expert guidance** - to help you confidently operate the instruments.
- **Data analysis support** - with access to powerful software and a dedicated workstation for both manual and unsupervised analysis.
- **Personalized assistance** - available for panel design, sample prep, and data interpretation.
- **Cell sorting services -** using the BD AriaFusion for high-quality, conventional sorting.

Who we are

With expertise in flow cytometry and a passion for technology, the dedicated CAF team is here to empower you to master your experiments and analysis with confidence!

Location

Per. 17
Chemin du Musée 18
CH–1700 Fribourg

Contact

cellanalyticsfacility@unifr.ch
sarah.cattin@unifr.ch

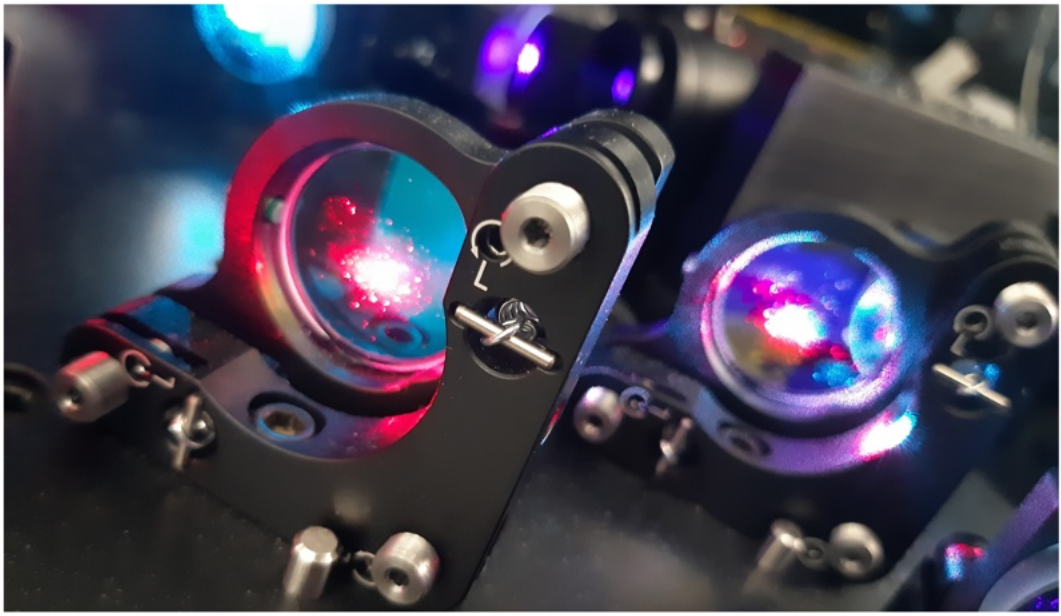
- **Single-cell mRNA library preparation -** powered by 10x Genomics technology.
- **Quality control services** - for DNA libraries and mRNA samples.
- **Knowledge sharing** - through courses, workshops, and hands-on sessions in flow cytometry.

Examples of research questions

1. Patient blood samples are analyzed for 32 cellular markers to identify potential disease biomarkers.

2. GFP- and dTomato-expressing T cells isolated from various mouse tissues (spleen, lymph nodes, intestine, or salivary gland) are separated from the main organ for independent analysis.

3. Cultured cells are exposed to different drugs, and their viability and cell-cycle status are assessed by flow cytometry to evaluate drug effects or resistance.



Mouse Phenotyping Platform

Where mouse behavior meets cutting-edge metabolic insight

The Mouse Phenotyping Platform at the University of Fribourg, launched in 2022, is a state-of-the-art core facility designed to advance research in metabolic and behavioral physiology.

Our mission is to provide scientists with access to highly specialized tools and expertise, enabling a deeper understanding of how biological and pharmaceutical interventions impact whole-body metabolism. Central to the platform is a 16-cage, temperature-controlled indirect calorimetry system (ambient range 4 °C to 35 °C) that allows precise measurement of energy expenditure, locomotor activity, feeding and drinking behavior, and core body temperature. We also offer pair- and yoke-feeding paradigms to dissect food intake regulation, as well as live body composition analysis using EchoMRI to quantify fat mass, lean mass, and water. Our team supports users throughout study design, data collection, and analysis.

What we do

- 16 temperature-controlled Promethion metabolic cages provide complete metabolic phenotyping capabilities (metabolic rate, respiratory quotient, movement and feeding behavior)
- Live telemetry can provide continuous body temperature and movement analysis
- Specialized capacity to undertake yoke- or pair-feeding experiments
- Complete body composition of live mice using EchoMRI Whole Body Magnetic Resonance Analyser
- Help with experimental design, scientific question refining, and data analysis and interpretation
- All experiments are physically run by a dedicated technician

Who we are

We are a physiological mouse phenotyping center within the Endocrinology, Metabolism, and Cardiovascular department in the Section of Medicine

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Location

Per. 09, EMC department
Chemin du Musée 5
CH-1700 Fribourg

Contact

Yann.ravussin@unifr.ch
Isabelle.scerri@unifr.ch

Who can access the core facility?

All research groups from the University of Fribourg and associated Institutes can get access to the facility infrastructure.

Our services are also available to external persons. Interested parties should directly get in touch via email.

Both internal and external groups will be required to pay a pay-per-use fee that can be requested via email and will be dependent on experimental size, complexity, and duration. Please contact us if you have any questions, ideas or particular needs.

How to use the core facility?

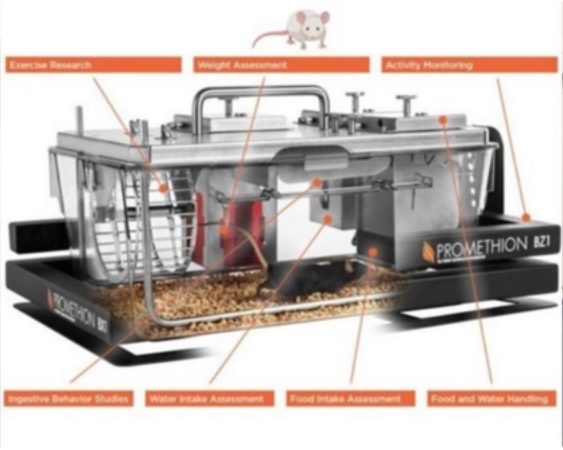
Please contact us directly via email. Together we can determine the best strategy for your experiments.

Examples of research questions

1. Cancer research – Tumor-bearing mice are monitored for energy expenditure and body composition to assess cancer-induced cachexia and treatment effects.

2. Neuroscience – Pair-feeding paradigms reveal how neural circuits and candidate genes regulate appetite, activity, and energy balance in mouse models.

3. Metabolic disease – Dietary or drug interventions are tested by tracking fat mass, lean mass, water, and thermogenic responses under controlled temperatures.



Research core facilites @ UniFr

Bioimage Core Facility (BICORE)

Illuminating science through advanced bioimaging

We offer access to state-of-the-art light microscopy through our shared core facility. Our mission is to support researchers throughout the entire process- from sample preparation to data acquisition, data analysis and visualization.

Who can access the core facility?

All research groups affiliated with the University of Fribourg and associated institutes are welcome to use the facility, following the standard access procedure outlined in the BICORE usage policy. Services are also available to external users, interested parties are encouraged to contact us directly via email.

How to use the core facility?

If you are a first-time user, we recommend reaching out to us via email. Together, we will identify the most suitable instrument for your project, considering factors such as sample origin and type, preparation method, environmental conditions, fluorescent probes, and the specific structures you wish to measure and analyze.
To begin, please download and review our usage policy, which contains detailed instructions on how to access and use the facility.

What we do

- Maintain and upgrade a comprehensive set of high-end optical imaging systems
- Advise users on experimental design and optimal measurement strategies
- Provide tailored training and guidance for instrument operation
- Maintain and upgrade image analysis software and workstations
- Manage servers for secure storage and efficient handling of imaging data

Who we are

The Bioimage Core Facility is jointly run by computer scientist Felix Meyenhofer and neurodevelopmental biologist Boris Egger, who bring complementary expertise in light microscopy. Felix oversees the operational management of the facility, while Boris is responsible for scientific direction and teaching.

Location

Per. 02
Route Albert-Gockel 1
CH–1700 Fribourg

Contact

bioimage-admin@unifr.ch

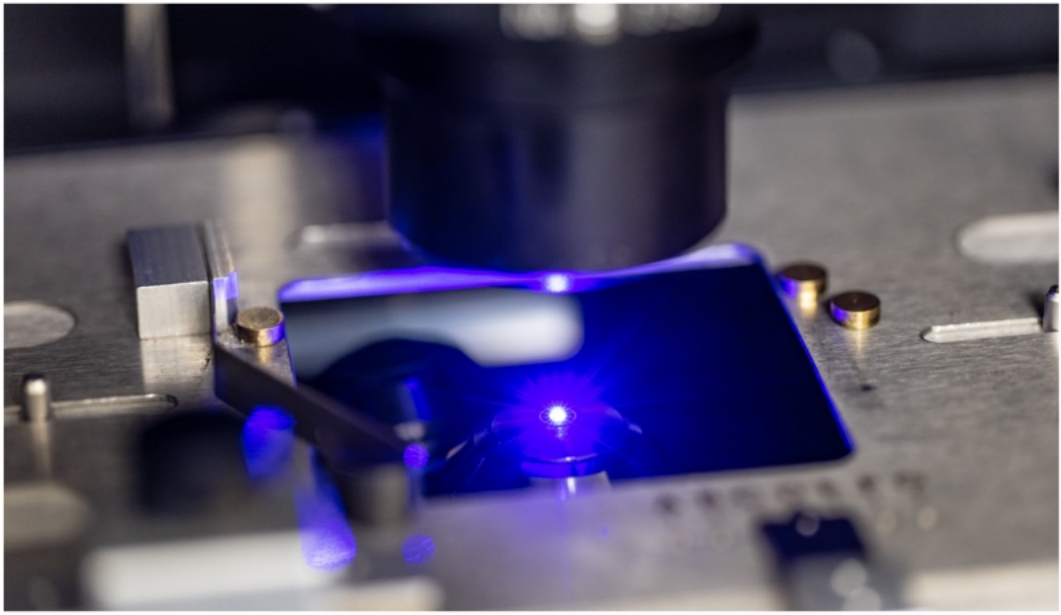
- Provide information to use instruments in efficient manner through website, wiki, reservation system and issue tracker
- Share expertise in light microscopy and image analysis through student courses and workshops
- Develop and promote open-source solutions for image acquisition and analysis
- Monitor technological advancements and encourage the adoption of methods that best serve user needs

Examples of research questions

1. Monitor cell division in living tissue by recording time-lapse movies with an epifluorescent microscope.

2. Image large sets of histological tissue sections using a fully automated slide scanner.

3. Assess protein-protein interaction in cell culture through fluorescent lifetime measurements on a laser scanning confocal microscope.



Metabolomics and Proteomics Platform (MAPP)

We establish molecular profiles – from small molecules to large proteins – of your biological samples

The Metabolomics and Proteomics Platform (MAPP) provides state-of-the-art mass spectrometry services for small molecules, proteins, and peptides. We support researchers from experimental design to data interpretation, offering both targeted and untargeted analyses. Our expertise ensures reliable molecular insights tailored to diverse biological questions.

The Metabolomics and Proteomics Platform (MAPP) offers comprehensive services to explore the molecular composition of biological samples. On the metabolomics side, we perform both broad-spectrum and targeted analyses of small molecules, providing a detailed picture of metabolite profiles. Our expertise also extends to advanced computational analysis, helping researchers make sense of complex datasets. On the proteomics side, we specialize in the identification and quantification of proteins and peptides, enabling insights into biological processes and molecular mechanisms.

A key strength of MAPP is our support at every stage of a project: from experimental design, through measurement and analysis, to interpretation of results. We work closely with researchers to ensure the best possible outcome for their specific biological questions. Whether you want to capture global molecular profiles or focus on a specific pathway or protein set, we provide high-quality results you can rely on.

Who we are

Pierre-Marie Allard is head of the Metabolomics Unit of the MAPP platform, here we propose methods to describe the chemical diversity of small molecules (below 2000 Da) in your biological samples.
Dieter Kressler is head of the Proteomics Unit of the MAPP platform, here we characterize and analyze bigger peptides and proteins in your samples.

Location

Per. 05
Chemin du musée 10
1700 Fribourg

Contact

pierre-marie.allard@unifr.ch
dieter.kressler@unifr.ch

What we do

- Untargeted metabolomics analysis of small molecules
- Targeted metabolomics analysis of specific compounds
- Computational analysis of metabolomics data
- Identification and quantification of proteins
- Peptide profiling and characterization
- Support in experimental design
- Guidance in data interpretation
- Collaborative project development

Examples of typical research questions

I have no idea of the metabolic content of this sample, can you provide me with annotations and structure propositions ?

What families of proteins are present in a given biological sample, and how do their levels differ across treatments?

Is compound X present in my sample, in which amount ?

Bioinformatics & Biostatistics Platforms

Making sense of life science data

This core facility is dedicated to provide bioinformatics & biostatistics data analysis support to life-science researchers of the University of Fribourg.

Who can access the core facility?
All research groups from the University of Fribourg and associated institutions can get access to the facility infrastructure following standard procedure.
Our services are also available to external persons & groups. Interested parties should directly get in touch via email.

How to use the core facility?
Contact us via email or phone or visit us during our BAOBAB meetings!

What we do

- Project planing and grant writing
- Power analysis and sample size estimation
- Software testing and development
- Data management plan DMP and data deposit in public repositories
- Data analysis (subject to a fee depending on the amount of work)
- Training and Teaching

Who we are

We are organised with two heads, one for the bioinformatics (Dr. Falquet L.) and one for the biostatistics (Dr. Rohr R.).

Examples of research questions

T2T genome assembly and annotation of a plant or an animal

Bulk RNAseq experimental design with multivariate or time course analysis

Metagenomics WGS or Microbiome 16S data analysis of any microbial community

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Location

PER01 & PER23
Chemin du Musée 10 & 15
CH–1700 Fribourg

Contact

laurent.falquet@unifr.ch
rudolf.rohr@unifr.ch
bugfri@unifr.ch

https://www.unifr.ch/scimed/facilities/en/facilities/bioinformatics-and-biostatistics/

AMI Nanocharacterization platform Scattering

Exploring materials structure and dynamics at the nanoscale

We offer expert support and access to advanced scattering techniques for material and molecular characterization, including SAXS, WAXS, SLS, and DLS.

Our facility provides tailored support for researchers studying the structure and behavior of materials at small scales. We help define the best strategy for your samples and guide you through preparation, measurement, and data analysis. Our team ensures smooth access to instruments and software, and we're here to help you interpret your data meaningfully. We welcome both internal and external users and are committed to making scattering techniques accessible and impactful for your research.

How to get access / how to book

Please contact us by email for first-time guidance.

Who we are

We are a research support unit offering scattering-based material analysis.

What we do

- Advise on scattering strategies for diverse sample types
- Provide training for SAXS, WAXS, SLS, and DLS techniques
- Support sample preparation and measurement workflows
- Offer data processing and interpretation assistance
- Promote method development and innovation

Examples of research questions

1. What is the size distribution of particles in a colloidal suspension?
2. How does material structure change under different environmental conditions?
3. What is the aggregation behavior of proteins in solution?

Location

Per. 18
Chemin des Verdiers 4
CH–1700 Fribourg

Contact

sandor.balog@unifr.ch

https://www.unifr.ch/scimed/facilities/en/facilities/aminano/

AMI Nanocharacterization platform Microscopy

High-end light, electron and atomic force microscopy

This core facility provides advanced imaging services in scanning, transmission, and focused ion beam electron microscopy, alongside atomic force microscopy. These complementary platforms enable structural analysis, compositional mapping, and 3D reconstruction on micro- and nanoscale specimens.

What we provide

Our electron microscopy portfolio encompasses scanning electron microscopy (SEM), transmission electron microscopy (TEM), and focused ion beam (FIB) techniques, each offering unique capabilities. SEM excels at high-resolution surface imaging and compositional mapping from bulk or coated specimens, which is vital for studying polymers, cellular topography in biology, and nanoparticle surfaces in nanoresearch. TEM, in contrast, transmits electrons through ultra-thin samples, yielding unparalleled resolution (< 0.5 nm) and internal structural detail.
FIB-SEM integrates site-specific milling with concurrent imaging, enabling users to slice and reconstruct 3D architectures within complex samples.
Laser scanning, darkfield, Raman confocal, and fast fluorescence microscopy expand imaging capabilities by enabling non-destructive optical sectioning, increased contrast of unstained samples, molecular identification, and rapid dynamic analysis.
Atomic force microscopy (AFM) complements electron microscopy by mapping mechanical, electrical, and topographical properties at the nanometer scale under ambient conditions. Its capacity to probe soft matter and hydrated samples suits polymer films, biomolecular assemblies, and nanodevices, permitting correlations between mechanical properties and microstructure.

Together, these modalities enable researchers e.g. to unravel micro-structure–property relationships, discern cellular and subcellular organization, and characterize particle morphology, interfaces, and functional surfaces.

Who we are

The AMI nanocharacterization platform of the Adolphe Merkle Institute (AMI) offers access to advanced light, electron and atomic force microscopy.

Location

Per. 18
Chemin des Verdiers 4
CH–1700 Fribourg

Contact

dimitri.vanhecke@unifr.ch
jorge.larios@unifr.ch

What we do

- Align, calibrate and maintain all microscopes to assure correct and unbiased scientific measurements
- Train researchers in the usage of the microscopes until they can conduct their own measurements
- Provide advise and help with experimental design concerning reaearch questions in the field of microscopy
- Discuss and advise on sample preparation techniques
- Conduct pilot studies and proof-or-principle
- Inform and train on post-processing and image processing routines
- Give courses on Image processing

Examples of research questions

1. Observe and map surface topology or characterize colloidal assemblies, pore networks, and interfaces in 2D or 3D (SEM and FIB-SEM)

2. Measure the average nanoparticle diameter of commercial or home-made nanoparticles using transmission electron microscopy. Optionally: in crystalline samples, record an electron diffractogram to calculate the unit cell length.

3. Watch live how nanoparticles are being internalized by macrophages in a laser scanning microscope

GeoImage and Analytics Core Facility

Visualizing and analyzing (geo)materials using multi-scaled techniques

The GeoImage and Analytics Core Facility provides state-of-the-art two-, three-and four-dimensional microscopy platforms and chemical and structural analyses of sample materials across multiple disciplines. We provide a modern analytical platform available to scientists, professionals and industry.

The GeoImage and Analytics Core Facility is hosted by the Department of Geosciences at the University of Fribourg and combines multiple instruments for imaging, experimentation, and analytical solutions. Our facility provides techniques for chemical and structural characterization and visualization of samples from the nanometer to the decimeter scale in 2D (SEM, petrographic microscopes, cathodoluminescence microscopy, autofluorescence microscopy) and 3D (nano- and micro-CT), mineralogical and crystallographic sample characterization (XRD), elemental analyses (IC), petrophysical analyses (porosity, permeability, density, acoustic velocity) and image analyses including an automated platform for quantitative particle-by-particle analyses (TIMA).

Our instruments are ideal for different types of materials, from natural and synthetic geomaterials, environmental samples, chemical compounds to biological samples. We provide a large range of instruments and machines for sample preparation. In addition to providing our analytical infrastructure, we also discuss with you your research questions and accompany you through the steps of sample preparation, measurement, data analyses, and interpretation. Training courses are provided on the different instruments.

Who we are

The GeoImage and Analytics Core Facility is a coordinated research effort lead by the Sedimentology and the Mineralogy-Petrology research groups of the Department of Geosciences.

Location

PER 07
Chemin du Musée 6
1700 Fribourg

Contact

Christoph.neururer@unifr.ch
Anneleen.foubert@unifr.ch
Esther.schwarzenbach@unifr.ch

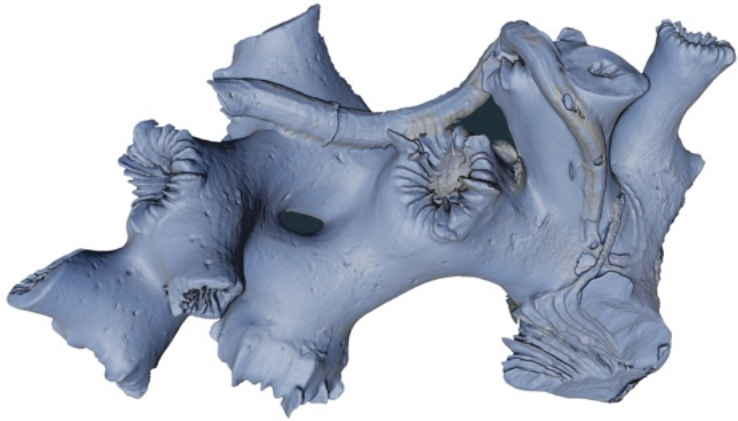
What we do

- TIMA TESCAN Scanning Electron Microscope with automated mineralogy and particle analyses
- Bruker SkyScan Nano-Computer Tomography
- CoreTOM TESCAN spectral Micro-Computer Tomography providing non-destructive 3D elemental analyses
- Cold Cathodoluminescence Microscopy
- Rigaku X-ray powder diffractometer for routine qualitative phase analyses
- Nikon Scanning Petrographical Microscopy with polarized and reflected light
- Nikon Fluorescence Microscopy
- Numerous sample preparation devices

Examples of research questions

1. Characterization of the chemical and crystallographic properties of minerals and the mineralogical composition and mineral abundance in geomaterials.

2. 3D characterization of geo-samples including 3D spectral elemental analyses and 4D experimentation to study microbe-mineral-environment interactions, climate/environmental archives, fossils, petrophysical properties of geomaterials and/or fluid-rock interactions



Chemistry Department Analytical Platform

From Atoms to Molecules to Materials: Tools for chemical discovery

Our facility provides cutting-edge analytical methods to explore molecular structures, materials, compositions, and their properties. Supported by state-of-the-art mass spectrometry, NMR spectroscopy (Liquid and Solid), X-Ray Photoelectron Spectroscopy and X-ray diffraction, we enable researchers to accurately characterize complex compounds, from small molecules to materials, driving innovation in chemistry and beyond.

Understanding molecules, polymers, and nanomaterials requires the right combination of analytical tools. The chemistry department's analytical platform offers advanced methods that open a window into the invisible world of atoms and structures. Mass spectrometry reveals molecular weights and precise compositions, supporting applications from small volatiles to complex polymers. Nuclear magnetic resonance spectroscopy, both liquid and solid samples, offers deep insights into molecular connectivity and dynamics, capturing both liquid and solid-state samples with precision. X-ray diffraction provides unparalleled detail on crystalline structures, resolving atomic arrangements with remarkable accuracy. Finally, X-ray photoelectron spectroscopy provides chemical insights on surfaces and interfaces. Together, these complementary techniques form a powerful framework for research, enabling discoveries across organic, inorganic, and materials chemistry. Beyond routine measurements, they offer flexible use, expert guidance, and support for publication-ready results. Whether clarifying unknown compounds, verifying purity, or unravelling molecular complexity, our facilities empower researchers with reliable data and methodological excellence. The integration of these services enables scientists to approach problems from multiple perspectives, thereby gaining a more comprehensive understanding. This synergy fosters creativity, strengthens collaborations, and drives breakthroughs across academic and applied research.

Who we are

The chemistry platform proposes a large choice of analytical techniques (currently more than 20 different instruments) and expertise. Come to discuss with one of our specialists.

Location

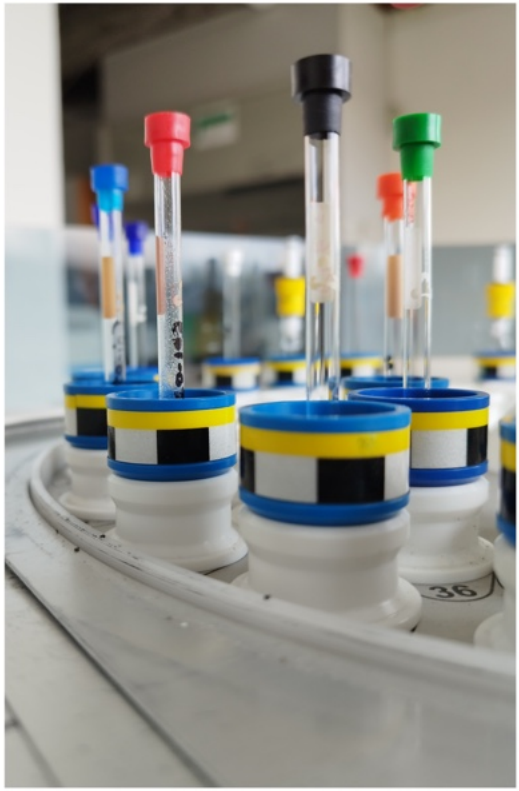
Per. 10
Chemin du musée 9
1700 Fribourg

Contact

ali.coskun@unifr.ch (head of analytical platform)
aurelien.crochet@unifr.ch (X-ray)
krzysztof.piech@unifr.ch (NMR)

What we do

- Deliver accurate molecular weight and composition data.
- Offer advanced NMR spectroscopy for both liquid and solid samples.
- Unravel crystal structures with X-ray diffraction.
- Support polymer and materials analysis.
- Provide high-resolution results for publications.
- Enable routine and advanced experimental access: NMR, mass, Single crystal diffraction, powder diffraction, SEM, XPS, FT-IR, UV-vis, Fluorimeter, CD, TGA, DSC, SAXS, ICP-OES, XPS, Raman, BET.
- Assist with data interpretation and reporting.
- Train researchers for independent use of analytical instruments and data interpretation.



Examples of typical research questions

Chemical synthesis verification: Confirms the structure and purity of newly synthesized compounds.

Reaction mechanism studies: Tracks intermediates and products over time.

Materials characterization: Determines composition of alloys, polymers, or ceramics.

Research core facilites @ UniFr

wojciech.gajewski@unifr.ch (spectroscopy)
albert.ruggi@unifr.ch (Mass spec.)
antoine.scalabre@unifr.ch (SEM)

https://www.unifr.ch/chem/en/services/platforms/

LearningLab Fablab & flight simulator

Fabrication and prototyping facilities & flight simulator for research

The LearningLab Fablab offers a space for hands-on experimentation with digital fabrication and prototyping. Standard digital fabrication machines are available, together with materials and electronic components.
The UniFR flight simulator is an industry-grade setup for research in digital neuroscience, human factors and adaptive safety-critical systems.

tThe LearningLab Fablab is curated by Human-IST and the Department of Informatics (DIUF). Its aim is to offer a digital prototyping infrastructure to research or teaching projects. It provides standard digital fabrication machines together with numerous digital components such as sensors, actuators, batteries, processing units, VR headsets etc. Basic electronic lab equipment is available, as well as usual consumables. The focus is put on building proof-of-concepts with off-the-shelf components.

The facilities are available for the whole UniFR community. Access can be granted on request and machines reserved using OpenIris. Workshops are organized and training courses can be offered to learn how to use the machines autonomously.

The UniFR flight simulator is a research platform designed for high-fidelity flying environments. It models a fixed-base twin-engine aircraft with two pilot seats. On top of realistic cockpit equipment, an instructor station allows real-time scenario management and data collection. The system can be integrated with eye tracking, brain activity, and physiological sensors, enabling advanced studies in cognition, attention, and human–machine interaction. The setup supports both aviation training and interdisciplinary research in digital neuroscience, human factors, and adaptive systems.

What we do

- Laser Cutter Trotec Q400, with usual materials
- 3D printing machines Prusa MK4S, Prusa SL1S, with PLA/ABS/TPU materials

Who we are

The LearningLab FabLab is a project led by Human-IST (Julien Nembrini) and DIUF (Samy Rami) researchers together with Informatics students.

Location

Per. 21 A260
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1700 Fribourg

Contact

julien.nembrini@unifr.ch (Learning Lab FabLab)
samy.rami@unifr.ch (flight simulator)

- Volterra One PCB printing machine
- Processing units (Arduinos, ESP32, Raspberry Pis zero/3/4) together with off-the-shelf sensors, actuators and power sources
- AR/VR Headsets (Hololens, MetaQuest 2)
- Industry grade TiaGo Base robot, Dobot-arm robot
- Flight simulator: Fixed-base Beechcraft Baron B58 twin-engine flight simulator with two pilot seats, featuring full dual flight controls and a Garmin G1000 glass cockpit, with Microsoft Flight Simulator 2020

Examples of typical research questions

1. LearningLab Fablab: Can a mobile robot map an indoor environment with labeled objects to the level of accuracy needed for helping vision-impaired people through AR headsets?

2. Learninglab FabLab: Can a physical interface to an intelligent lighting system help reducing power consumption with increased user comfort?

3. Flight simulator: can the monitoring of multiple physiological markers accurately detect human subject stress levels in order to augment user interfaces in safety critical situations?

Research core facilites @ UniFr

Physics Platform

From atoms to applications: Physics powers progress

We provide cutting-edge tools for spectroscopy, magnetism, superconductivity, light scattering, microscopy, optical twezers and X-ray analysis to explore quantum materials and nanoscale phenomena.

Our platform integrates diverse technologies to study quantum behaviors, phase transitions, and material dynamics. Strengths include ultrafast lasers, magnetic measurements, light scattering, optical tweezers, and high-resolution X-ray probes. This supports interdisciplinary research in condensed matter, biophysics, and nanotechnology, enabling insights from atomic scales to real-world applications.

Examples of research questions

1. Ultrafast lasers excite materials; measure electronic dynamics

2. X-ray probes atomic structures in quantum solids

3. Light scattering assesses nano-particle behavior in colloids

What we do

- Ultrafast laser and electron spectroscopy
- Electronic transport and magnetic properties characterization
- Light scattering and force analysis with optical tweezers
- High-resolution X-ray absorption/ emission
- Thin film deposition: oxides, metals, organic materials
- Optical properties of thin films with ellipsometry from THz to UV
- Theoretical modeling and simulations
- Interdisciplinary material property studies

Who we are

Physics Department team, offering spectroscopy, magnetism, light scattering, optical tweezers and X-ray methods

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Location

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