Faculty of Science,
Technology
and Medicine

University of Luxembourg

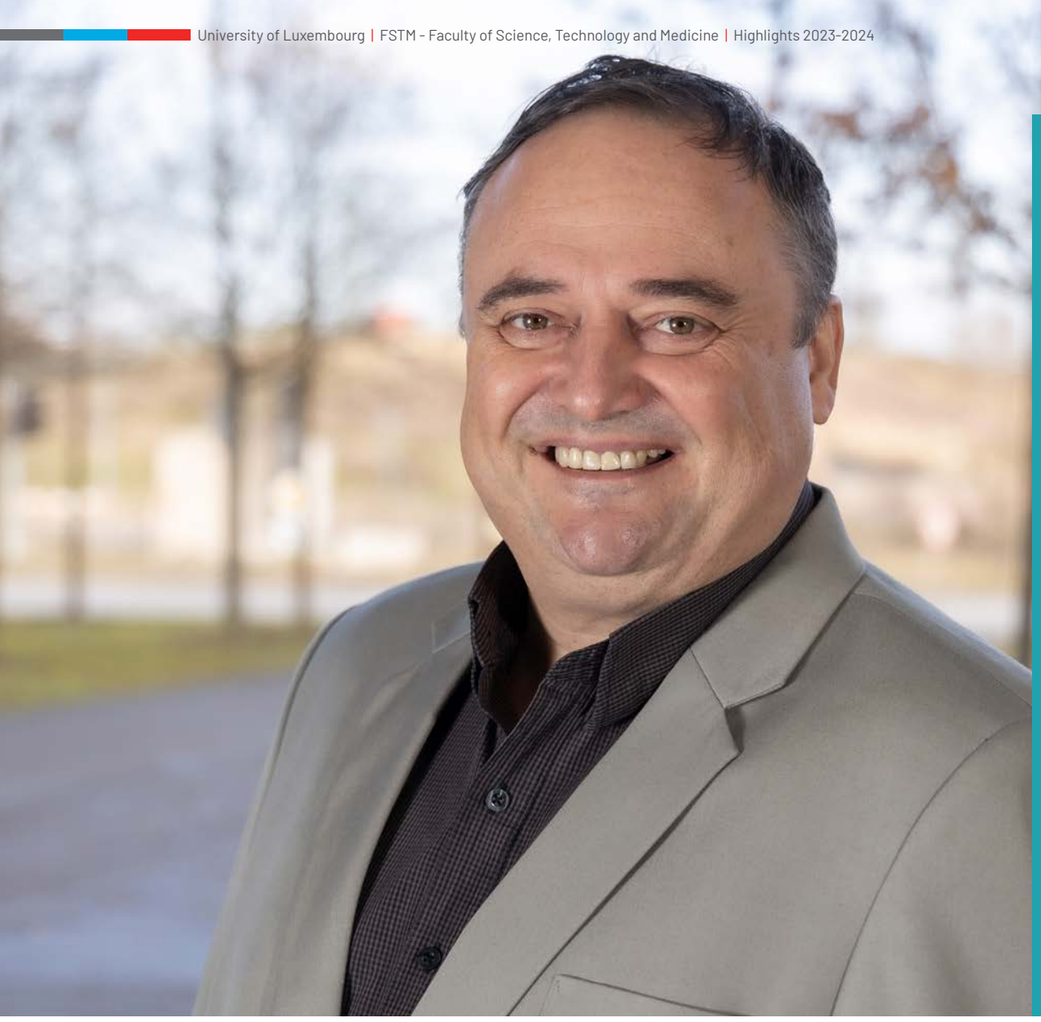
Faculty of Science, Technology and Medicine (FSTM)

Highlights 23-24

uni.lu
UNIVERSITÉ DU
LUXEMBOURG

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Table of Contents



Management Team

The management team of the faculty ensures the smooth running and growth of the faculty and acts as link between the rectorate and the departments. Pascal Bouvry is working with Frédérique Perrein who manages the administration and Bradley Ladewig, as vice-Dean who oversees the teaching part. Together, they have been working closely alongside the heads of department and the faculty council, driven by passion and enthusiasm for the faculty.

Frédérique Perrein

Bradley Ladewig

Word of the Dean

Welcome to the 2023-2024 edition of the Faculty of Science, Technology and Medicine (FSTM) Highlights at the University of Luxembourg. This year marks a pivotal moment in the faculty's journey, as we celebrate over two decades of excellence in research, education, and societal engagement. After 22 years of existence, a significant number of our esteemed professors are entering retirement. Their contributions have laid a strong foundation, and we express our deepest gratitude for their dedication and impact.

This transition also opens an exciting chapter: FSTM is actively renewing its academic body by recruiting a new generation of full, associate and assistant professors. These talented individuals will bring fresh perspectives and expertise in emerging strategic areas such as artificial intelligence, data science, cybersecurity, quantum technologies, and sustainable engineering. At the same time, we are expanding our capabilities in medicine, midwifery, and nursing sciences—fields that are vital to Luxembourg's evolving healthcare landscape.

The faculty secured prestigious European Research Council (ERC) grants, expanded interdisciplinary research, and deepened partnerships with industry and international institutions. Notable achievements include the MACHINEDRUG project accelerating drug formulation through AI, and the LuxHyVal initiative driving green hydrogen innovation. Teaching excellence was recognised through awards and the successful graduation of students from pioneering programmes like the Master in Technopreneurship and the Bachelor in Medicine.

FSTM also strengthened its commitment to public engagement through science festivals, AI debates, and the Scienteens Lab, while fostering a culture of inclusion and inspiration with events like GEM Day and the Science Slam. As we reflect on these accomplishments, we look forward to continuing our mission of excellence in research, education, and societal impact.

Pascal Bouvry

Key figures

Studies

2513 students
- 1066 Bachelor students
- 602 Master students
- 635 Doctoral candidates
- 210 lifelong learning students

Research

- Total of 12 ERC grants
- 798 publications (2024)

Society

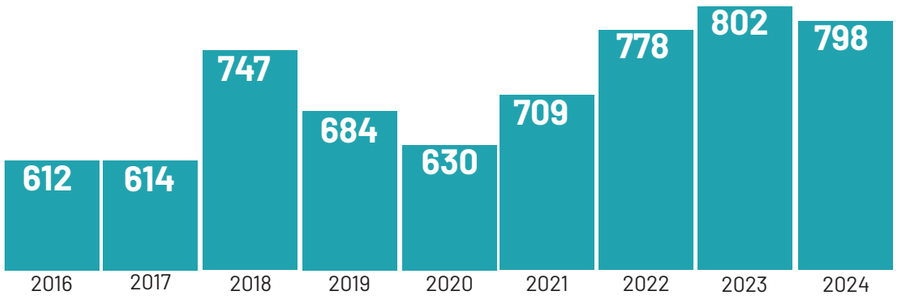
- A lot of collaborations with public and private partners
- Several outreach activities

Excellence in research

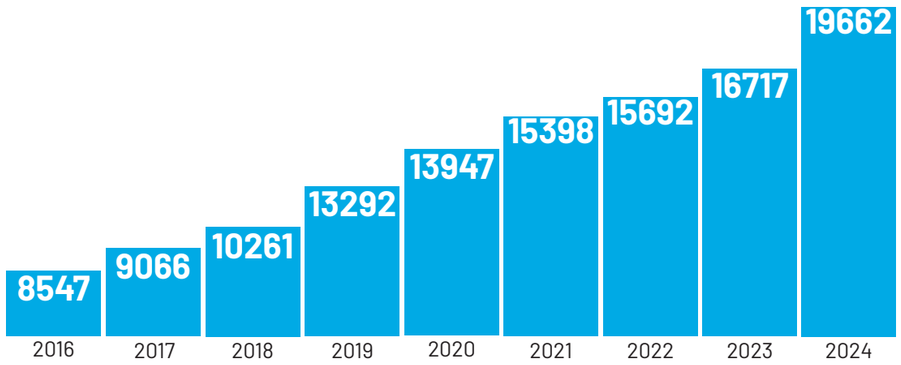
In 2023-2024, research at the faculty has expanded with the recruitment of 9 new professors, the acquisition of prestigious grants, the impressive number of publications as well as the development of new collaborations. Several interdisciplinary projects have been launched to answer complex scientific questions which require experts from different fields. The faculty greatly pursues its mission of excellence in fundamental and applied research.

Key figures

Evolution of the number of publications



Evolution of the external project expenditures



University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

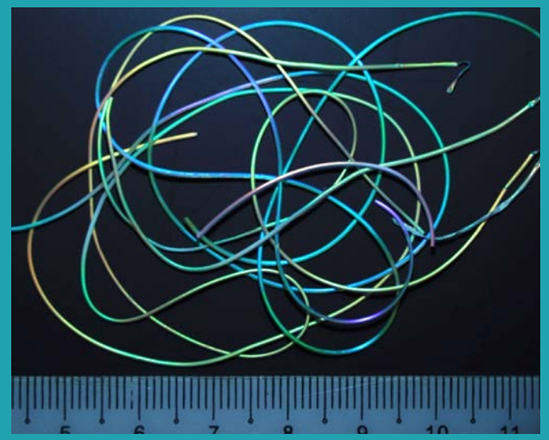
Key grants

ERC grant MACHINE DRUG

In May 2023, Prof. Alexandre Tkatchenko received a "Proof of Concept" Grant from the European Research Council (ERC) for his project "MACHINE-DRUG". The project aims to discover ideal drug formulations with unique machine learning algorithms, so that the drugs are both stable and therapeutically effective. The project could accelerate the process of drug formulation by 100 times, making it safer, cheaper and faster to bring novel drugs to the market.

Prof. Tkatchenko and his research team develop machine learning methods and novel conceptual tools based on quantum and statistical mechanics to study systems with thousands of atoms. These innovative techniques could also be applied in different fields such as food industry, agrochemicals, organic energy materials, highlighting that the potential applications of the project's outcomes are limitless.

ERC Synergy grant ALCEMIST



In November 2024, Prof. Jan Lagerwall, together with two scientists from NOVA School of Science & Technology and Cambridge University, received 8.4 million euros of funding from the European Research Council (ERC) to create and study liquid crystal elastomers (LCEs) of a new kind which enable novel functionalities. The new LCEs originate from bio-sourced polysaccharides like cellulose, they will be recyclable and/or degradable as required, and they are highly responsive, changing color, shape, stiffness or damping properties in response to stimuli like heat, light, humidity or strain.

By disrupting the conventional paradigm of how to make LCEs, the project ensures that the new materials are eco-friendly, cost-effective, and ready for large-scale production. Through the project entitled "Atypical liquid crystal elastomers: from materials innovation to scalable processing and transformative applications" (ALCEMIST), the three researchers will thus unlock the full potential of LCEs.

Interdisciplinarity

In 2023-24, several projects were jointly developed by two or more entities within the University which underline the importance of interdisciplinarity in research.

Synthetic voices can influence your online shopping choices!

Do you find yourself gravitating towards options suggested by a natural-sounding voice? You're not alone! Computer scientists Prof. Luis Leiva and Dr. Mateusz Dubiel, together with social scientist Dr. Anastasia Sergeeva, have discovered that the type of computer-generated voice significantly impacts your decisions, even more than the actual content.

The study reveals that users are more likely to choose options presented by a highly natural synthetic voice compared to a robotic one. This is because perceived engagement, ease of understanding, and how well the voice fits the topic at hand can sway your behaviour.

This work is an outcome of an interdisciplinary collaboration between researchers from the Faculty of Science Technology and Medicine, and the Faculty of Humanities, Education and Social Sciences. It combines insights from fields of speech processing, cognitive psychology, and behavioural change to demonstrate that the type of synthetic speech can not only affect its perception but also impact users' behaviour.

Striking the balance: Protecting privacy while enabling lawful interception

Can we catch criminals while still protecting privacy? Computer scientist Dr. Andy Rupp and expert in cyber policy Prof. Niovi Vavoula are tackling this challenge with a new security protocol designed to balance communication privacy and lawful interception.

The aim is to allow court-authorised monitoring of encrypted or anonymous communications while preventing illegal surveillance. Researchers are striving to increase public trust in law enforcement by using cryptographic protocols. These protocols require law enforcement agencies to deposit an encrypted surveillance warrant on a tamper-proof blockchain before accessing a suspect's data. A committee then verifies the warrant's legitimacy. This process leaves permanent records of surveillance measures on the blockchain, allowing for audits by an impartial examiner and assuring the public against mass surveillance.

This project is a collaborative effort between the Faculty of Science, Technology and Medicine and the Faculty of Law, Economics and Finance.

COVID-19 and neurodegeneration: a potential link

European scientists have studied how COVID-19 may exacerbate or even trigger neurodegenerative diseases. According to their findings, COVID-19 can lead to neurodegeneration in susceptible individuals, though the risk does not seem hugely greater than for some other illnesses.

The infection seems to increase the aggregation of the protein tau, another causative factor for Alzheimer's. Lastly, the systemic inflammation triggered by COVID-19 could have long-term consequences for brain health as chronic inflammation has been implicated in the pathogenesis of several neurodegenerative diseases.

Dr. Josh Berryman, physicist at the Faculty of Science, Technology and Medicine coordinated the European project and Prof. Michael Heneka director of the Luxembourg Centre for Systems Biomedicine (LCSB) took part in it.

Can smart tech and music education strengthen skill acquisition?

Embodiment in music holds that music cognition is strongly determined by the way our body interacts with music. While studies have shown that body movements influence the way we learn, teach and perform music, this paradigm still presents scientific challenges to be resolved.

To address this gap, music education scholar Prof. Luc Nijs, electrical engineering scientist Prof. Inès Chihi and computer scientist Prof. Luis Leiva launched the research project "Skills Acquisition in Music performance through a Multi-Sensing approach" (SAMUSE).

By using sensors and a unique framework, researchers are set to discover the secrets behind skill acquisition in music performance, seeking to pinpoint the psychophysiological changes that occur as musicians improve.

This project is a common work between the Faculty of Science, Technology and Medicine and the Faculty of Humanities, Education and Social Sciences.

Industrial collaborations

Investigating water-based propulsion of microsatellites

In May 2023, the University and Bradford Deep Space Industry started a partnership collaboration to build an efficient and reliable numerical model for water-based propulsion of microsatellites.

Led by Prof. Stephan Leyer from the Department of Engineering, the aim of this research project is to numerically investigate, model and understand the physics of water vaporisation and heat transfer processes taking place in the heating chamber of a resistojet propulsion system.

The project combines the industrial partner's need for advanced design tools with the University of Luxembourg's expertise in developing scientific models.

Improving meteorology measurements

In September 2023, the University and the United Kingdom Met Office (UKMO) engaged on a collaborative path for research and development in the field of Global Navigation Satellite System (GNSS) meteorology.

Led by Prof. Rebecca Teferle from the Department of Engineering, researchers support the UKMO in their operational use of atmospheric products derived from GNSS observations such as from the US Global Positioning System and Europe's Galileo constellations.

This agreement enables both partners to engage on further collaborative research projects involving, for example, adding further GNSS constellations and developing more effective processing algorithms.

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Driving the use of green hydrogen in Luxembourg

The Luxembourg Hydrogen Valley (LuxHyVal) project was launched in June 2024 with 17 partners from seven countries, with the University of Luxembourg as the main coordinator represented by Prof. Bradley Ladewig from the Department of Engineering. LuxHyVal aims to locally produce green hydrogen to replace imported grey hydrogen, aligning with Luxembourg's decarbonisation strategy. It employs a comprehensive approach to gradually upscale production, focusing on specific objectives and key performance indicators.

LuxHyVal also strives to innovate across various domains to achieve significant impacts from technical, economic, environmental, social, and replicability perspectives.
Through seven innovation pillars, it advances the state-of-the-art in hydrogen deployment and applications, driving sustainable energy solutions and leading hydrogen innovation.

The project will have a direct positive impact for the economy through job creations, as well as for public mobility. For instance, the bus companies Sales-Lentz and TICE will upgrade part of their fleet to fuel cell hydrogen (FCH) buses. Moreover, the green hydrogen produced in the electrolyser would enable industrial partner Ceratizit to replace its use of natural gas-derived hydrogen.

A revolution in crystal structure prediction of pharmaceutical drugs

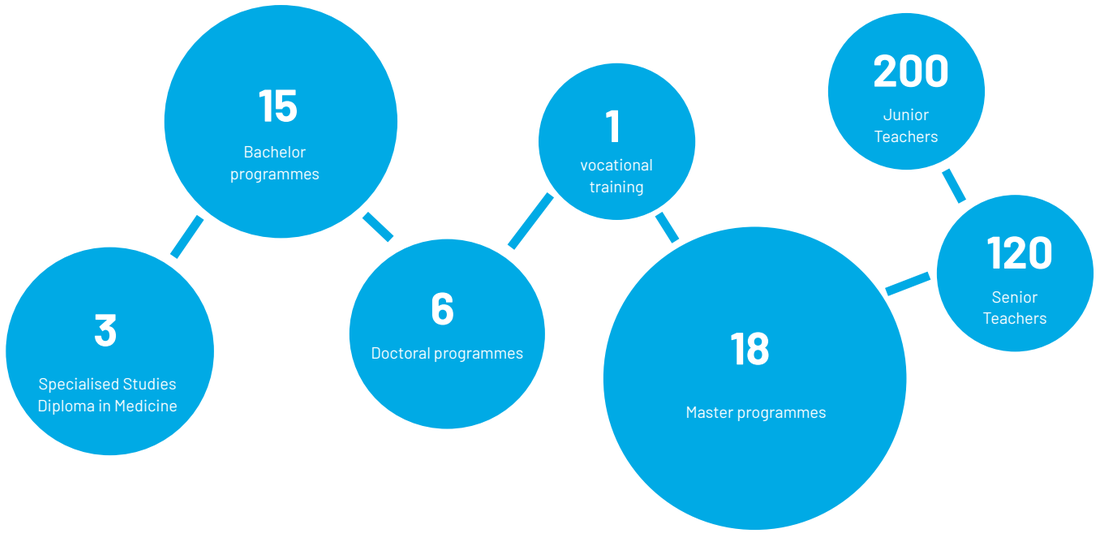
Physicists at the University of Luxembourg, in collaboration with Avant-garde Materials Simulation (AMS) and pharmaceutical companies, are leading a revolution in crystal structure prediction. Their research demonstrates that computer simulations can reliably predict crystal form stability under real-world conditions. This advancement addresses a critical challenge in the pharmaceutical industry, where late-appearing, stable crystal forms can lead to the withdrawal of life-saving medicines.

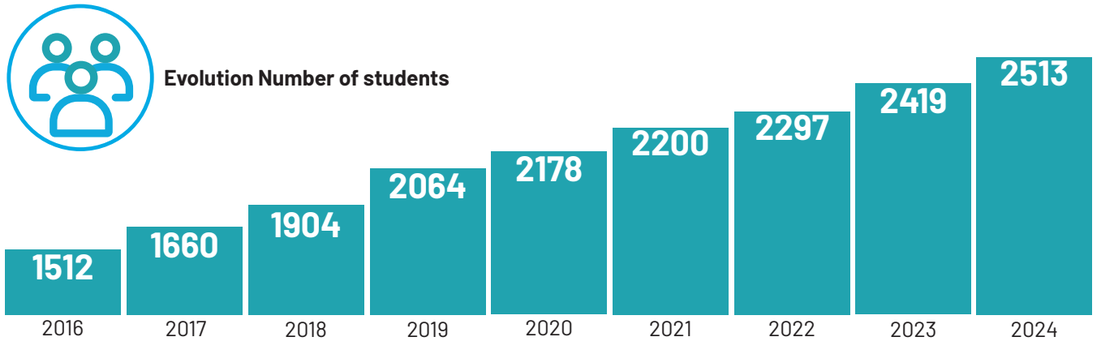
By creating a reliable experimental benchmark of solid-free energy differences, researchers were able to predict these differences with surprising accuracy using high-performance computing. According to Prof. Alexandre Tkatchenko, from the Department of Physics and Materials Science, computational methods developed in his group have been quickly adopted to predict the energetics of drug crystal forms.

Thrilling teaching activities

In 2023-2024, the teaching activities within the faculty expanded in life sciences and computer science to answer the increasing need of highly skilled graduates in nursing, supercomputing and cybersecurity. On the one hand, the faculty has launched an initial Bachelor in Nursing and four specialised Bachelors in Nursing Sciences. On the other hand, the faculty has created the Master in High Performance Computing and the Master in Cybersecurity and Cyber Defence.

Key figures





New programmes in Nursing

Specialised Bachelors in Nursing Sciences

The four specialisations in Nursing Sciences were launched in September 2023 with 47 students, 7 students for the specialty of medical technical assistant in surgery, 14 students in anesthesia and resuscitation, 16 students in pediatrics and 10 students in psychiatry. These Bachelors are intended for professionals who already have a degree in general nursing and who wish to specialise in one discipline. The programmes combine theoretical training using innovative and interactive methods with practical training in hospital and out-of-hospital care environments.

nursing.uni.lu

Bachelor in Nursing Sciences – Nurse responsible in General Care

Launched in September 2024 with 33 students, the Bachelor in Nursing Sciences – Nurse responsible in General Care is based on a competency-based educational approach and disciplinary foundations in nursing sciences. It prepares for general nursing practice with varied patient populations in diverse clinical settings. This Bachelor allows students to develop initial nursing skills based on nursing sciences and promotes practice based on proven research results.

nursing.uni.lu

New programmes in Computer Science

Master in High Performance Computing

The Master in High Performance Computing was launched in September 2023 with 14 students from all over the world. The programme provides students with high-level knowledge and skills in data analytics, machine learning, computational science, parallel programming and artificial intelligence. The students are well-connected to key players as they have the possibility to do an internship in academic institutes, HPC companies and supercomputer centres in Europe. This Master trains the next generation of HPC experts in Luxembourg and Europe.

mhpc.uni.lu

Master in Cybersecurity and Cyber Defence

Launched in September 2024 with 35 students, the Master in Cybersecurity and Cyber Defence offers an interdisciplinary training that builds from information and system security, threats and incidents management and analysis, and cyber defence research methods. Taught by leading experts in the field with attention to providing a well-balanced mix of theoretical and practical instruction, the programme prepares students to work in the growing professional fields of cybersecurity and cyber defence and also trains them to pursue a future in research and academia from a doctoral level, following graduation.

mcysd.uni.lu

New collaborations

National level

In October 2023, the University of Luxembourg and the Centre Hospitalier de Luxembourg (CHL) further consolidated their collaboration by signing a framework agreement for scientific and educational cooperation, with the goal of providing university courses in medicine and the health professions.

This new agreement underscores an institutional commitment to delivering high-quality teaching for students and advancing the development of continuing education for teachers. Another of its aims is to promote closer collaboration between the two institutions in the field of clinical research, including joint recruitment procedures. This will open doors to attractive career prospects for healthcare professionals, actively engaging them in research and academic teaching.

CHL
Centre Hospitalier de Luxembourg

European level

In 2023-2024, several agreements were signed with Ecole des Mines Nancy and Sorbonne University in France, Politecnico di Milano and Universita della Svizzera Italiana in Italy, Polish Academy of Science in Poland and Sofia University in Bulgaria to establish dual degree agreements and further academic collaborations.

MINESnancy ARTEM
POLITECNICO MILANO 1863
PAN POLISH ACADEMY of SCIENCES
UNIVERSITAS SEDIS SAPIENTIAE · SOPHIA ·
SORBONNE UNIVERSITÉ
USI

International level

In 2023, a new agreement was signed with the University of Science and Technology of Hanoi and the Indian Institute of Technology Kanpur to establish a flexible framework for academic collaboration in science and technology between both entities. Academic collaboration may include joint research and writing projects involving one or more faculty members from each institution, group visits to the other institution and joint course offerings.

USTH 5th VIETNAM FRANCE UNIVERSITY
INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Teaching Awards

In 2023 and 2024, four members of the faculty have received a teaching award for their outstanding work as teachers.

Markus Schäfer

Markus Schäfer is a Professor in structural engineering and composite structures and Course Director for the Bachelor in Civil Engineering. He is involved in the organisation of the study programme and deeply cares about the development of his students. Markus appreciates the exchange with students as well as bringing them forward in their study and professional life.

© Sophie Margue

Sri Sudha Vijay Keshav Kolla

Sri Sudha Vijay Keshav Kolla is a Postdoctoral Researcher in manufacturing engineering. In addition to his research, he teaches courses in lean management, operational excellence, scientific writing, and digital factory planning. His students appreciate his outstanding personality, great support and enthusiasm. He always encourages students to do their best.

© Sophie Margue

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Christophe Ley

Christophe Ley is an Associate Professor in mathematics. He also leads the group Modelling, Interdisciplinary Research, Data Science, Applied Mathematics and Statistics and president of the Luxembourg Statistical Society. Students widely appreciate Prof. Ley for his genuine care and dedication to their success.

© Michel Brumat

Guendalina Palmirotta

Guendalina Palmirotta is a Postdoctoral Researcher in mathematics. She focuses on solving differential equations on special spaces such as Riemannian manifolds of compact and non-compact types through theoretical and numerical approaches. Her work has applications in physics, particularly in astronomy. Guendalina values her interactions with students and enjoys helping them overcome challenges. She is highly regarded by her students for her expertise and dedication.

© Michel Brumat

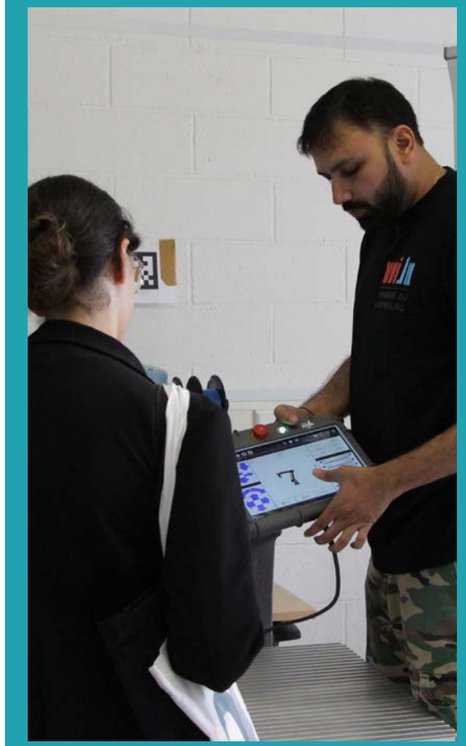
Making science popular

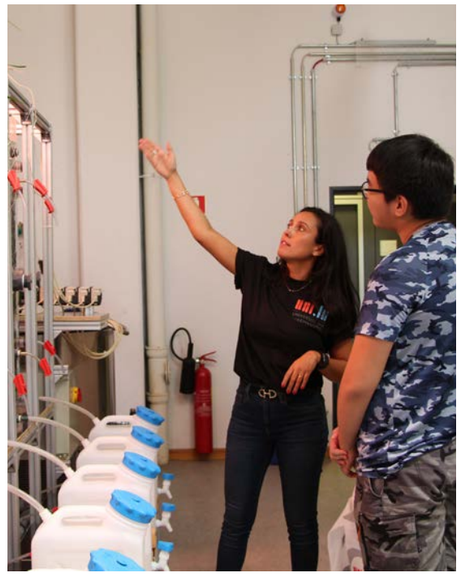
The faculty is highly involved in outreach activities and members of the faculty have been offering and participating in a varied programme of activities. In 2023-2024, the faculty stood out through its strong presence at several science fairs and the celebration of the 10th anniversary of the Scienteens Lab.

Participation in outreach activities

Portes Ouvertes Luxembourg

In September 2023, the faculty participated in the national initiative Portes Ouvertes Luxembourg by opening its laboratories on Kirchberg campus. More than 400 participants attended the event and had the opportunity to learn more about wastewater treatment, industrial robots and laser, 3D printing, global navigation satellite system and physical mechanics via interactive activities and exchanges with researchers.





Relais pour la Vie 2023 & 2024

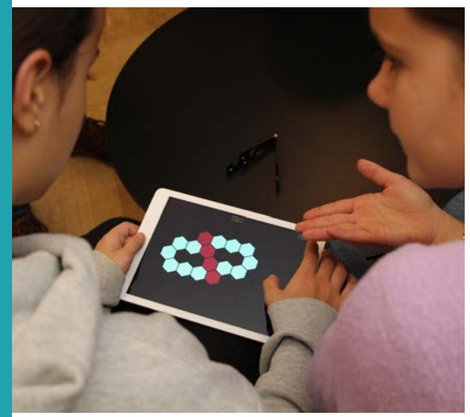
The cancer research team from the University of Luxembourg took part in the 2023 and 2024 editions of the Relais pour la Vie. Organised by the Fondation Cancer, this charity event aims to collect donations to support research projects.

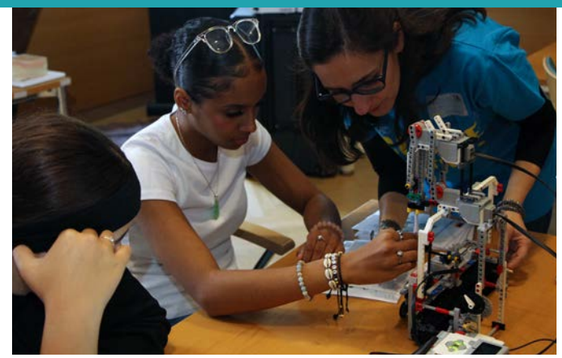
© Claude Piscitelli

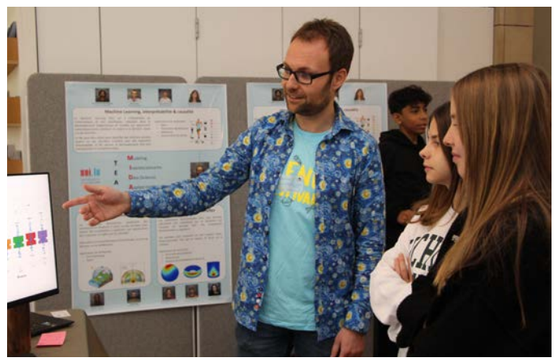
© Claude Piscitelli

Science Festival 2023

In November 2023, researchers from the University participated in the Science Festival Luxembourg at Neumünster Abbey. They interacted with the public to explain science in a fun and interactive way. Visitors could play with sensors, virtual reality, puzzles, logo robots and table tennis.

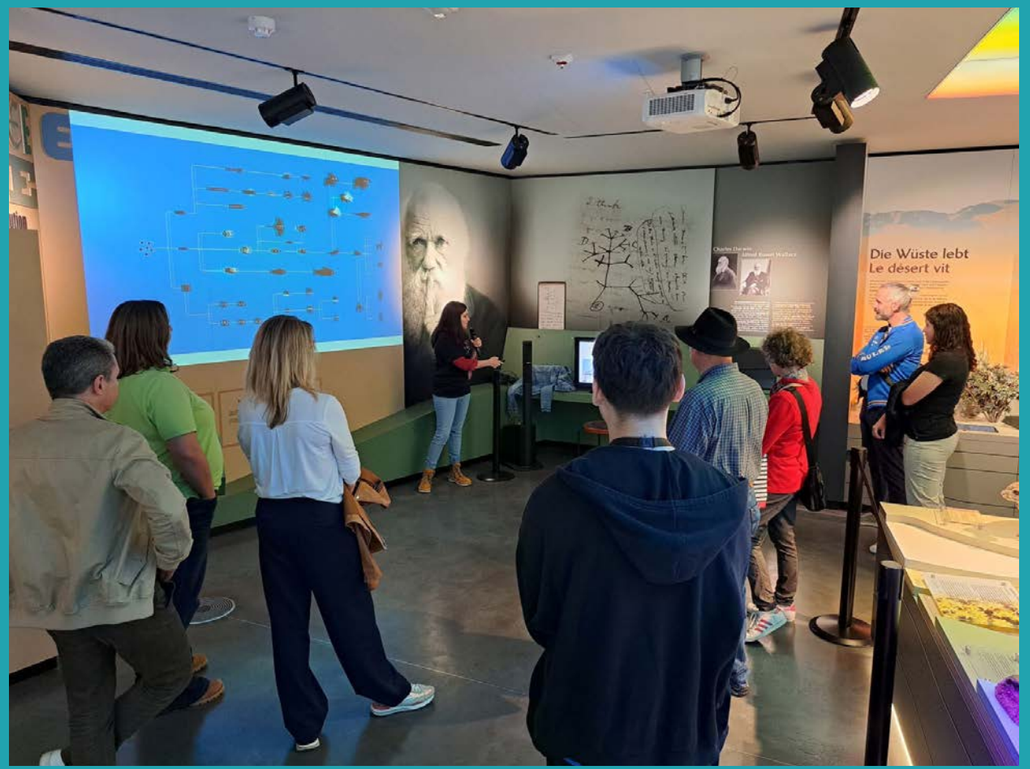






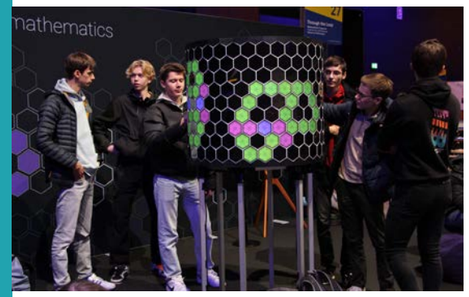
Luxembourg Museum Days 2024

In May 2024, researchers from the University of Luxembourg presented their fascinating work at the Musée national d'histoire naturelle Luxembourg. They exchanged with visitors about solar energy, biology and thermodynamics, shapes and figures.



Researchers Days 2024

In November 2024, researchers from the University of Luxembourg shared their passion for science with the following interactive activities: Journey through our digestive system, A musical game to understand the challenge of collaboration in computing, Through the Loop: fragments of mathematics and Cryptographic secrets and mysteries.



Organisation of outreach activities

10th anniversary of the Scienteens Lab

In October 2023, the Scienteens Lab of the University of Luxembourg celebrated its tenth anniversary, under the patronage of Her Royal Highness the Hereditary Grand Duchess of Luxembourg. Since its creation, the educational laboratory for secondary school pupils in Luxembourg and the Greater Region has welcomed over 14.000 pupils, accompanied by 1500 teachers, and offers a wide range of activities in biology, mathematics, computer science, physics and sustainable development.

© Oliv'images

© Oliv'images

© Oliv'images

Congress Math en Jeans

In April 2024, the University of Luxembourg hosted its first regional congress of MATh.en.JEANS, welcoming more than 400 secondary school students and 100 teachers from Luxembourg, France, and Belgium. The MATh.en.JEANS initiative is an educational programme that introduces students to mathematical research through year-long collaborative projects advised by researchers.

The three-day congress featured over 27 hours of student presentations, a research forum, two keynote lectures by senior mathematicians, and cultural visits around Luxembourg. "We were impressed by the quality of the presentations. Participants made significant effort to convey their research findings," said Prof. Bruno Teheux, organiser of the congress.

AI debates with citizens

In 2023-24, several events were organised at the Cercle Cité in Luxembourg City to raise awareness and stimulate debates among citizens. The project was initiated by Prof. Christoph Schommer, Head of the Knowledge Discovery and Mining research group at the University of Luxembourg.

AI for our future

In 2023, more than 200 citizens took part in the five-part discussion series "LetsTalk100: AI for our future".

This series of debates addressed the role of artificial intelligence in the future society. The idea behind the debate series was also to bring together a large audience from academia, industry, government, media and the public.

The five topics focused on the challenges and opportunities of AI in education, medicine, arts, ethics and impact in the future.

AI Café and competition

Three AI Café were organised in 2024 to engage discussions and critical thinking with citizens The discussions focused on the impact of artificial intelligence on the labour market, on training and creativity and European regulations.

In addition, a competition was organised and seven finalists presented their innovative projects. The first prize was awarded to Marisa Steinmetz for her project "DreamMapper: AI-powered Career Orientation & Planning Platform for Teens".

DreamMapper aims to help young people navigate their career paths. It uses AI to provide personalised advice based on their skills, interests, and aspirations.

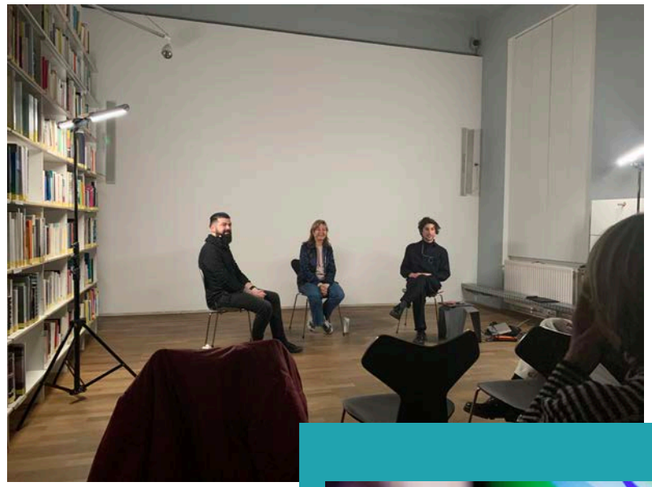
University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Virtual reality artwork

As part of the exhibition "Endodrome" which took place at Casino Luxembourg in 2023, Dr. Jean Botev, Head of the Collaborative and Socio-Technical Systems research group and the VR/AR lab at the University of Luxembourg was invited to have a conversation with renowned artist Dominique Gonzalez-Foerster.

Endodrome is the first virtual reality artwork by Dominique Gonzalez-Foerster. The eight-minute experience begins by immersing the audience in a hypnotic monochrome environment, before moving into an abstract visual space in which brightly coloured fields move with the gaze and breath. The work explores notions of space, alternative states of consciousness and interiority.

During an open discussion open to the public, Jean Botev and Dominique Gonzalez-Foerster exchanged about her virtual reality artwork Endodrome and the general potential of virtual reality for artistic expression and experience.



© Casino Luxembourg - Lynn Theisen

Celebrating 20 years of the University

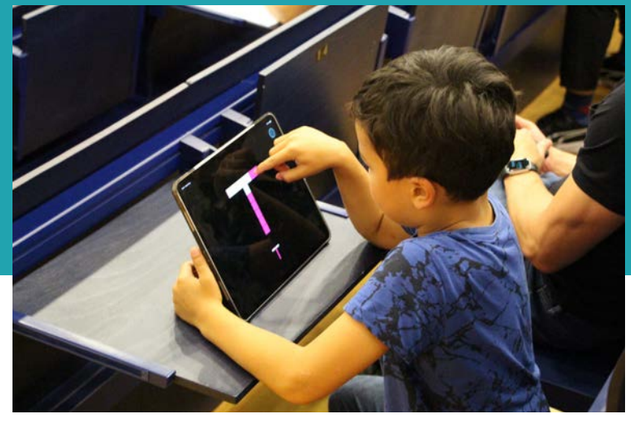
To mark the 20th anniversary of the University of Luxembourg, partners, supporters and members of civil society came together at the Maison du Savoir in September 2025. The ceremony was held in the presence of His Royal Highness the Grand Duke, the Prime Minister, members of the government, and more than 500 friends, partners and supporters of the University. It kicked off with the introduction of the University's brand-new mascot, in the shape of Luxembourg's red lion, and concluded with a festive birthday cake.

In addition, several public lectures were organised to tackle current topics and present the latest findings in research. The faculty participated with five lectures with Hugo Parlier, Elisabeth Letellier, Bradley Ladewig, Aurélia Chenu and Réka Markovic.

The simplicity of complexity: the art of unpuzzling mathematics

In September 2023, Prof. Hugo Parlier from the Department of Mathematics discussed geometry and more generally the processes of mathematical research through puzzles. The puzzles are played following simple rules on tiled surfaces using ideas stemming from the math of combinations, shapes and space. Around 70 participants attended the lecture in Belval.

Hugo Parlier



Colon cancer: what is the research doing?

The Colorectal cancer (CRC) is the second leading cause of cancer-related deaths worldwide. In October 2023, Prof. Elisabeth Letellier from the Department of Life Sciences and Medicine presented the current situation and therapies to fight this disease. She explained the research done at the University and at national level to find new therapies. Around 40 participants attended the lecture in Belval.

Elisabeth Letellier

Is Hydrogen really the energy of the future?

In November 2023, Prof. Bradley Ladewig from the Department of Engineering talked about hydrogen, its future and how to reach Net Zero. From its production to its usage, he explained how hydrogen would be stored and transported both locally and globally, and how it could be used in transport, manufacturing. He also gave an overview of the energy landscape. Almost 70 participants attended the lecture in Luxembourg city.

Bradley Ladewig

Diving into the quantum world: from curiosity to applications

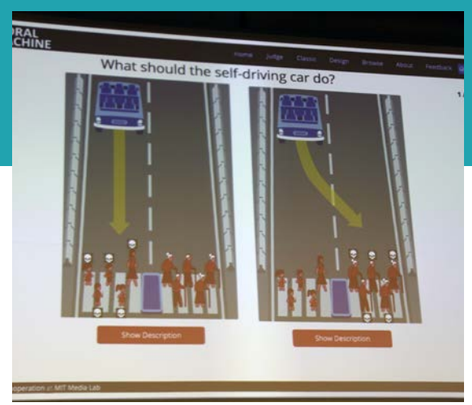
In January 2024, Prof. Aurélia Chenu from the Department of Physics and Materials Science explained quantum physics. Starting with the first moments of photosynthesis, she presented some experiments carried out around the world and in Luxembourg to explore the properties of the quantum world, in which light and matter are both waves and particles. Almost 90 persons attended the lecture in Belval.

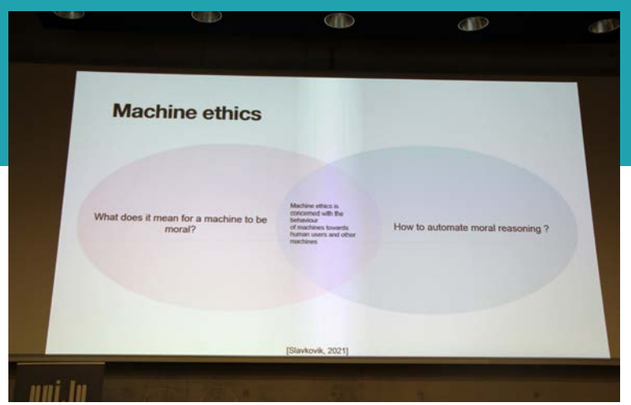
Aurélia Chenu

The do's and don'ts for future robots

In February 2024, Dr. Réka Markovich from the Department of Computer Science challenged the audience on how future robots should behave and on the increasing importance of machine ethics. She introduced the questions, considerations, and directions of what principles or rules future machines should obey and how this could happen by automating the process called normative reasoning. Around 70 participants attended the lecture in Belval.

Réka Markovic





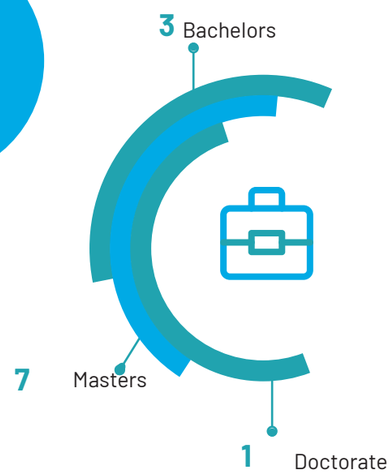
Computer Science

Key figures

3 RESEARCH AREAS

138 MEMBERS

11 STUDY PROGRAMMES



FUNDING AND COLLABORATIONS

Nearly €8 million acquired through national and international competitive grants, such as:
- ERC Advanced Grant CLOUDMAP
- EU H2020 ChronoPilot and BANANA
- EIC Pathfinder SYMBIOTIK

PUBLICATIONS (2023)

- 46 peer-reviewed articles in scientific journals
- 110 conference papers

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Editorial

The academic year 2023-2024 marked another dynamic period for the Department of Computer Science (DCS), as we continued to grow in research, education, and societal engagement. Two new professors joined the department: Prof. Decebal Mocanu in machine learning, with a focus on sparse neural networks, and Prof. Marko Rancic in high-performance and quantum computing, with the ambition to push the frontier of quantum algorithms. These appointments reinforce our strategic priorities in artificial intelligence, advanced computing systems, and information security.

Our research output this year reflected strong societal relevance. Projects such as the development of an AI-powered legal assistant for patent law and an AI-based system for artwork recommendation demonstrate the department's ability to address complex challenges at the intersection of technology, law, and culture. In security, we continued to build on our strengths in cryptography, privacy, and secure systems.

On the education front, we celebrated the first graduates of two innovative Master programmes: the Master in Technopreneurship, which blends technical and business skills, and the EUMaster4HPC, Europe's first pan-European HPC degree. In parallel, we expanded our outreach activities through initiatives like AI4EDU, including hands-on workshops for secondary school students and public dialogue on the use of ChatGPT in education. These activities reflect our continued mission to educate, innovate, and inform society on the transformative potential of emerging technologies.

More information: dcs.uni.lu

Nicolas Navet

Jean-Sébastien Coron

Staff

New professors

Decebal Mocanu

Decebal Mocanu joined the University in March 2023 as an Associate Professor in Machine Learning. His main research area focuses on sparse training for artificial neural networks to create the next generation of AI techniques and systems. He is also developing new machine learning courses for the bachelor and master programmes.

Marko Rancic

Marko Rancic joined the University in December 2024 as an Associate Professor in High Performance and Quantum Computing. He plans to develop algorithms for primitive quantum computers with a goal of achieving quantum supremacy on a daily basis. In addition, he is designing various courses in quantum algorithms and computational methods.

PhD & Postdoc stories

Patrick Keller

Experience at University: Patrick developed a novel approach to improve the traversal time bounds observable in simulation for the verification of critical embedded real-time systems.

Current position: Chief Technology Officer, Cognifyer.ai, Luxembourg.

Agnese Gini

Experience at University: First as a PhD and later as a postdoc, Agnese developed algorithms for cryptanalysis of public-key encryption schemes via lattices, multivariate polynomial systems and statistical learning-based techniques, solving the hidden subset sum problem, and investigated properties of Boolean functions with application in hybrid homomorphic encryption.

Current position: Cybersecurity architect at Autostrade per l'Italia in Florence (Italy).

Decebal Mocanu

Marko Rancic

Patrick Keller

Agnese Gini

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Research

When AI recommends artworks you will love

The beauty of art lies in its ability to evoke emotions and spark imagination, but understanding the message behind a piece can be challenging. Computer scientists from the University have studied the potential of advanced artificial intelligence and cutting-edge deep learning techniques in the domain of cultural heritage.

The algorithms, leveraging the combined power of textual and visual data of the artworks, are able to effectively capture the underlying meanings and themes in visual art through the fusion of visual and textual data.

"This research promises not only to have a transformative impact on cultural heritage but could also pave the way for the development of new technologies and methods for personalised visual content recommendation in various other domains, cementing the research's place at the forefront of modern technological innovation", comments Prof. Leiva, Head of the Computational Interaction research group and co-author of the study.

Their findings have been published in the ACM Conference on Human Factors in Computing Systems (CHI) in 2023.

AI-legal assistant for patent law

What if artificial intelligence could provide accurate legal advice? What if it could guide you through complex patent issues, even if you have no prior experience in the field? Researchers at the University have released an AI-driven legal bot that marks a significant advancement in the application of artificial intelligence in legal practice. While existing AI tools such as large language models (LLMS) or specialised platforms provide valuable decision-making support, they often lack guaranteed accuracy in legal matters. The new AI assistant aims to close that gap, delivering highly accurate legal insights tailored specifically to the complexities of patent law.

The AI assistant has been designed to help non-experts. Inventors can rely on its accuracy and simplicity to understand complex legal rules and issues without needing advanced knowledge in this field. By making legal advice more accessible, affordable, and accurate, this bot empowers users to make more informed decisions.

"This is a revolutionary advancement in the use of AI for legal purposes. Our goal is to provide users with guidance they can trust while navigating patent law, with accuracy as our top priority", comments Dr. Tomer Libal, Research Scientist within the Security and Trust of Software Systems research group and initiator of the project.

The tool is available here: legai-editor

Studies

Master in Technopreneurship celebrates its first graduates

Launched in 2021 by the University in partnership with the Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services (ILNAS), and the Luxembourg Lifelong Learning Centre (LLLC) of the Chambre des Salariés (CSL), the Master in Technopreneurship (MTECH) celebrated its first nine graduates in 2023. They are now pursuing their careers as engineers, consultants, and managers in a variety of national and international sectors.

mtech.uni.lu

"I liked the mix of academic and business experience of the lecturers. Academics brought the technical innovations, and the businesspeople brought the way to commercialise those innovations. The programme helped me not only to reflect on how to deliver the finance transformation but also to create the foundation for building the business case, the change management approach and the governance".

Joao Seixas Marques, Vice-President Finance Transformation at RTL Group

eumaster4hpc.uni.lu

First Graduating Class of EUMaster4HPC

Launched in 2022, the European Master For High Performance Computing (EUMaster4HPC) consortium celebrated the graduation of its inaugural cohort of 18 students in October 2024. This achievement represents a significant step forward for Europe's digital innovation capabilities as the continent seeks to secure its competitive edge in this critical field. Coordinated by the University of Luxembourg, the EUMaster4HPC project is Europe's first pan-European Master's degree dedicated to HPC, involving eight prestigious universities and over 100 partners across 23 EuroHPC countries.

"This programme broadened my typical Master's experience. I met experts in the field, applied my knowledge in challenges and hackathons, and built a large network of contacts. I'm now set to pursue a PhD with a well-known graph machine learning group".

Valentina Moretti, Doctoral student at Università della Svizzera italiana

Outreach

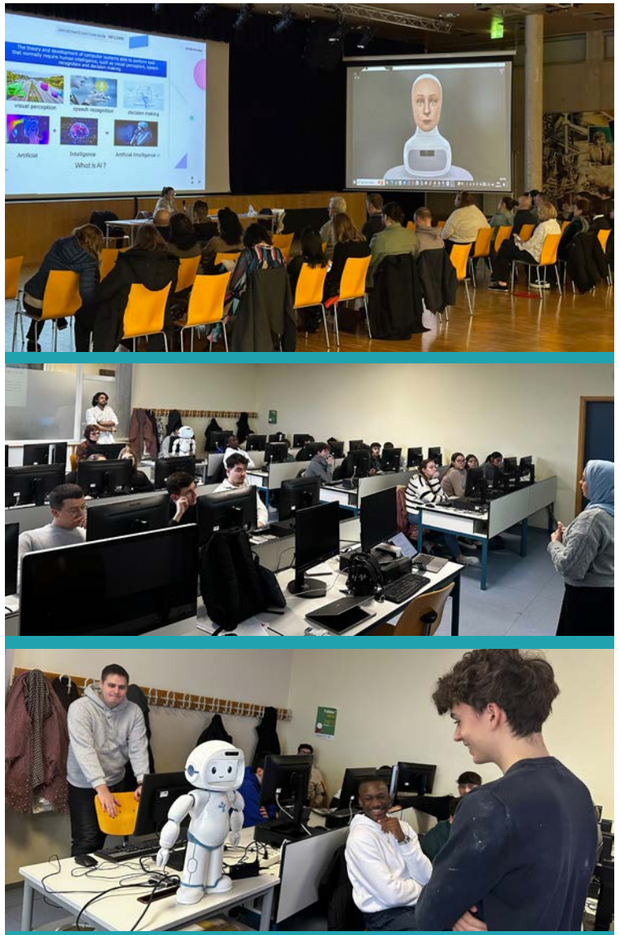
ChatGPT: An educational ally we didn't ask for, but have

How can AI tools like ChatGPT revolutionise the way we learn and teach? What potential do they hold for personalised education? While AI has vast potential, where do you think its limitations lie? Are there tasks that AI will never be able to perform as well as humans? Will AI create more opportunities or pose challenges?

From January to April 2024, six workshops were organised to introduce high school students to the world of Artificial Intelligence, with a special focus on the ChatGPT platform. The workshops took place in four secondary schools with 30 teachers and 120 students.

"Through this workshop, we aim to foster creativity, critical thinking, innovation, and enhance coding skills. Part of our mission is to empower students to craft their desired outputs in both writing and compelling narratives. We have designed practical exercises where students can compare code generated by ChatGPT with their own, enabling them to troubleshoot errors effectively", comments Dr. Sana Nouzri, Postdoctoral Researcher within the Knowledge Discovery and Mining research group and initiator of the project.

In addition, a conference was organised in February 2024 about the future role of ChatGPT in education. Experts from the University and Ministry of Education exchanged about the current dilemna between assistance and over-reliance. "It is time for educators, the orchestrators of learning, to treat ChatGPT as a supplementary tool, not the main act. It's crucial to create avenues for students to share just how much they've learned on this digital aid", comments Sana who organised the event.



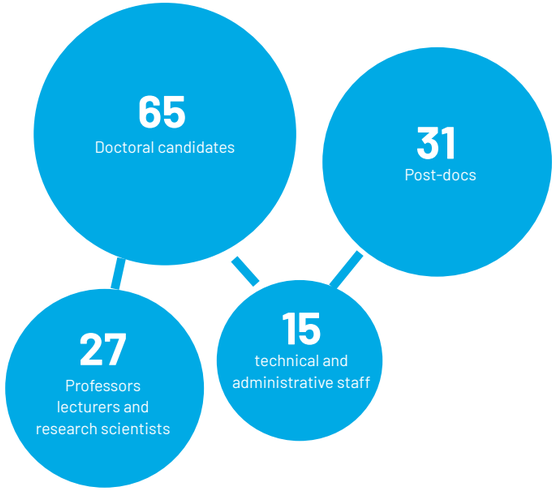
Engineering

Key figures

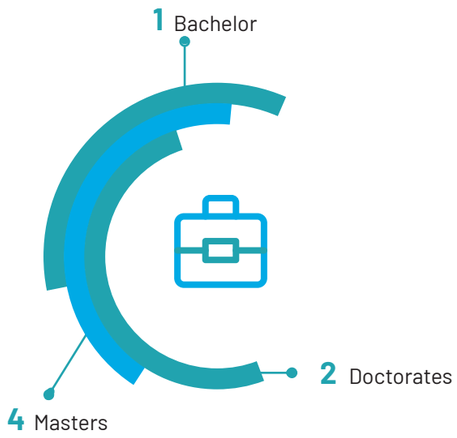
4 RESEARCH AREAS

- Civil, environmental & geospatial engineering
- Computational engineering & science
- Energy technology & electrical engineering
- Production, manufacturing & materials engineering

138 MEMBERS



7 STUDY PROGRAMMES



FUNDING AND COLLABORATIONS

- €9.5 million in 24 new projects with industry and public institutions
- €4 million in 9 new European projects

PUBLICATIONS (2024)

- 108 peer-reviewed articles in scientific journals

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Editorial

Society faces numerous challenges that demand robust efforts in research, development, and the education of future specialists. At the Department of Engineering (DoE), we've taken this as an opportunity to refine our strategy, expanding our emphasis on digitalisation and sustainability to also prioritise resilience and efficiency. Engineering must play a pivotal role in addressing energy supply issues and achieving sustainable management in production and operations. We are proud of the research projects undertaken in recent years and the many engineers we've trained who now hold key or even leading positions in Luxembourg and internationally.

As for all departments, the preparation and execution of the research evaluation was of great importance to us and has also helped us to see and value the success of our efforts in the past years in terms of research, education and outreach.

Two new colleagues joined our team in 2023. Prof. Arash Lavasan and Prof. Numa Bertola, filling the gaps in strategic engineering areas. Ongoing recruitments are related to the field of computational fluid dynamics, advanced manufacturing and digital methods in construction, which will allow to further foster multidisciplinarity, a key principle we embraced and we strongly believe in.

Our teaching programmes align with our core research topics and competences, covering mechanical, civil and electrical engineering at bachelor level, and sustainable production, civil engineering and management of resources and energy at Master level. Acknowledging the evolving nature of engineering, we will review our Masters to better address emerging topics and further align education with cutting-edge research.

More information: doe.uni.lu

Stephan Leyer

Francesco Viti

Staff

New professors

Arash Lavasan

Arash Alimardani Lavasan joined the University in September 2023 as an Associate Professor in computational soil mechanics and foundation engineering. His mission is to develop cutting-edge research in several critical areas such as resilient geostructures, geohazard and risk mitigation in geotechnics, sustainable energy geotechnics, and underground space engineering, all with a special focus on contributing to a more sustainable future.

Numa Joy Bertola

Numa Joy Bertola joined the University in January 2024 as an Assistant professor in Civil Engineering with a focus on concrete structures. His works centres on demonstrating that buildings and infrastructure can often be retrofitted, refurbished, or reused rather than demolished using new technologies, new materials, digital twins, and advanced civil-engineering knowledge.

PhD & Postdoc stories

Hana Brunhoferova

Experience at University: Hana helped to deepen the understanding of how constructed wetlands remove micropollutants from wastewater by quantifying the key elimination mechanisms.

Current position: Assistant Professor at University of Chemistry and Technology, Prague

Jeff Mangers

Experience at University: Jeff worked on integrating advanced recycling data into packaging design and later resulted in an AI-based spin-off with two colleagues from the University.

Current position: Chief Executive Officer at CRAB (spin-off of the University)

Piergiorgio Vitello

Experience at University: Piergiorgio developed novel data-driven approaches for estimating and predicting transit station flows based on mobile crowdsensing information.

Current position: Senior Data Scientist at Orange Luxembourg

Arash Lavasan

Numa Joy Bertola

Hana Brunhoferova

Jeff Mangers

Piergiorgio Vitello

Research

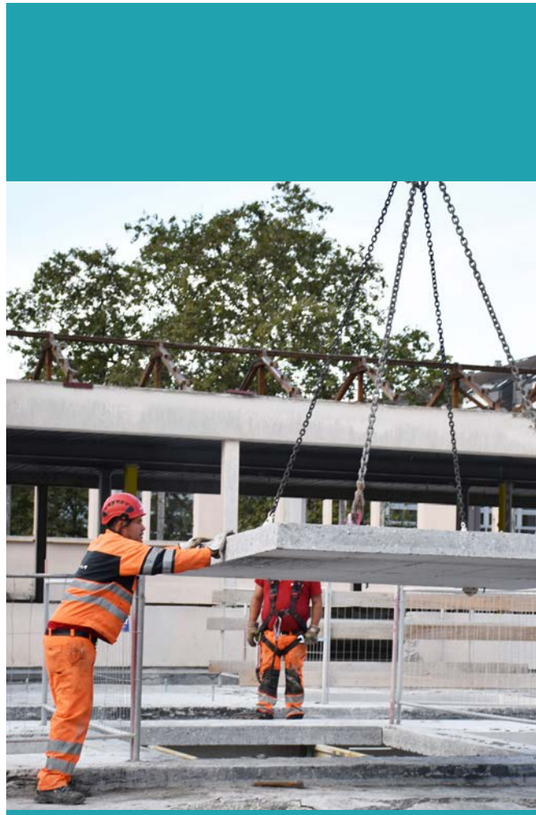
Designing new sustainable floor systems

How to reduce the carbon footprint of new floor systems? Researchers from the University of Luxembourg and EPFL have been able to reduce it by 80% which represents an enormous potential for the construction sector.

The study explores an original idea to reduce the detrimental environmental impacts of floor by reusing saw-cut reinforced concrete pieces salvaged from soon-to-be demolished structures. The study demonstrates how discarded cast-in-place reinforced concrete floors can be cut and reused to build new low-carbon, little-extractive, load-bearing building floors.

“We propose two new floor design solutions for housing and office buildings that valorise frequently discarded construction components, combining construction technologies already used by the industry. A parametric life cycle assessment model with 20,000 simulations shows drastic embodied carbon cuts compared to new flat concrete slabs, with solutions as low as 5 kgCO2e/m2, probably a record for building slabs”, comments Prof. Numa Bertola, Head of the Sustainable Concrete Structures research group at the University and co-author of the paper.

Their findings have been published in the Journal of Cleaner Production in 2024.

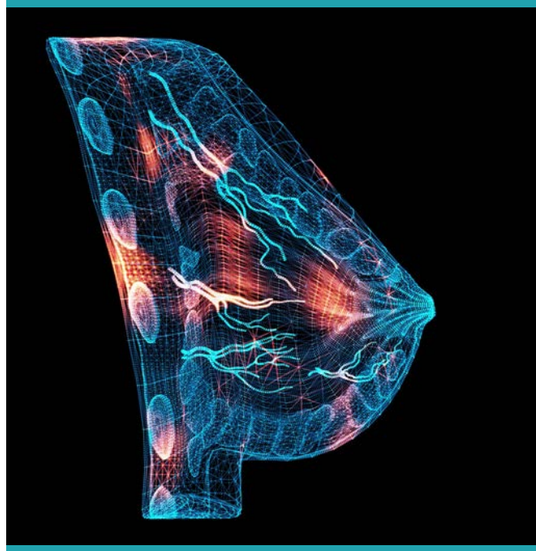


Making breast cancer surgery more effective

When doctors take a scan before surgery, the breast can move a lot between the scan and the actual operation. Researchers from the University have developed a new way to make breast surgery more precise and personalised by predicting these movements, making surgery more effective.

“Think of it like a GPS for surgeons, it helps them navigate and operate with more accuracy. We used a computer programme to create a personalised plan for each patient. We tested it and found it was really accurate, almost like having a personalised map for each surgery. For instance, we discovered that a part of the breast called the infra-mammary ligament, really matters in the surgery plan. This is a big step forward in making breast surgery more precise and tailored to each patient”, explains Prof. Stéphane Bordas who leads the Computational Mechanics research group at the University and co-author of the study.

Their findings have been published in the Clinical Biomechanics journal in 2023.



Studies

Investigating rail braking system

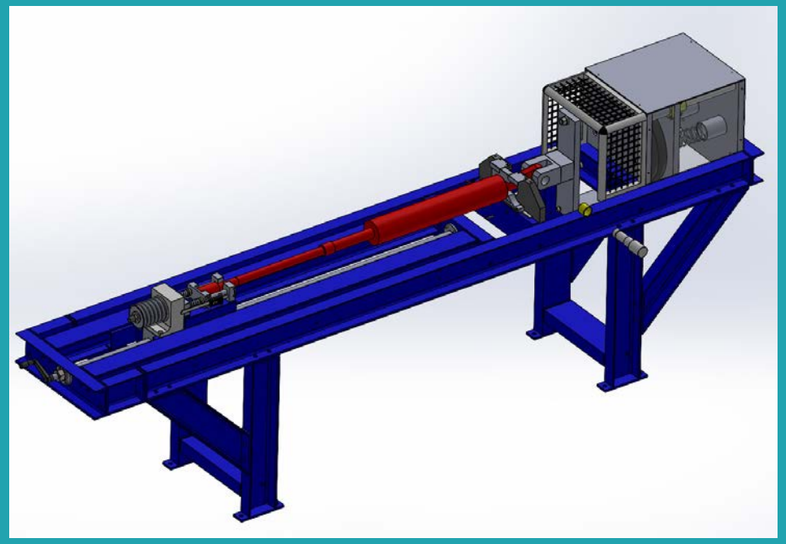
In rail freight wagons, the braking system plays a critical role not only for safety but also for environmental reasons. Brake regulators are essential components in braking systems that control and regulate the braking force to ensure safety and efficiency. The performance and behaviour of brake regulators are tested on dedicated test benches.

During his Bachelor studies in mechanical engineering, Scott Marx had the opportunity to apply the theoretical knowledge from his coursework to a real-world scenario. CFL Technics offered him a challenge: investigating the functionality of their brake regulator test bench and propose improvements tailored to a specific type of brake regulator. Scott modeled the existing test bench, adapted it, and proposed a redesigned brake regulator testing bench, including the manufacture of new parts.

He was so successful that CFL Technics entrusted him with a second project to design a test bench for another critical train brake component. "We were really impressed by the results of Scott's work. His proposals are now part of our testing capabilities presented to our customers. This is an excellent collaboration", comments Mr. Kimmich and Mr. Erpelding from CFL Technics.

"Scott's thesis is a good example of the projects carried out during the Bachelor in Engineering. It prepares students with technical knowledge and problem-solving skills", explains Claude Wolf, Senior lecturer and supervisor of Scott at the University.

beng.uni.lu



Outreach

Celebrating women in engineering

On the occasion of the International Women in Engineering Day, Prof. Inès Chihi gave an inspiring speech at the European Investment Bank (EIB) about the challenges and opportunities for women in engineering. This prestigious event brought together students, engineers from the private sector and academia and representatives from the institution to pay tribute to the remarkable contributions of women engineers.

In her presentation, Prof. Chihi discussed the challenges that a woman engineer may face during her studies. She also mentioned the role of educational institutions and society in encouraging girls to take STEM subjects. She specifically highlighted the role of social networks in explaining the importance, needs and capabilities of girls studying engineering.

"Scientific events and conferences are important, but we need to think of new ways to communicate and speak the language of young girls. We must consider social media, which has become an undeniable force in today's world", comments Inès.

European hydrogen economy

Despite reductions in Europe and USA, CO2 emissions are still rising globally. While photovoltaic and wind energy productions are essential part of phasing-down fossil fuels, large-scale storage of renewable energy still needs to be developed, and hydrogen (H2) could play a major role. This green economy is now being prepared in part in Luxembourg by its university and a number of industrial stakeholders.

In July 2024, renowned experts and hydrogen economy actors exchanged plans and best practices while exposing roadblocks on the way to a clean hydrogen economy.

The conference, opened by Prof. Stefan Maas, was organised as part of the Green SKHy Interreg project co-funded by the European Union. In total 17 partners from 6 countries and over 70 associated institutions including the University of Luxembourg work together in this project to promote hydrogen knowledge and skills.

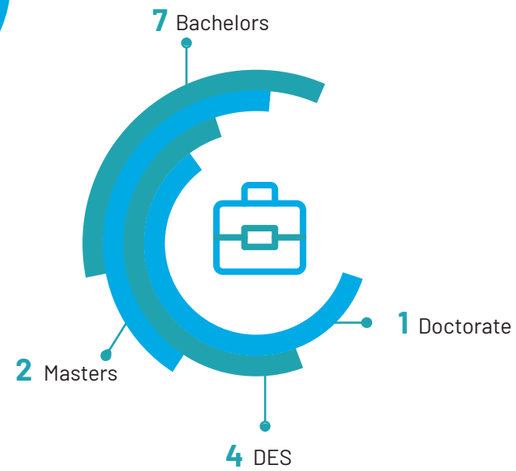
Health and Life Sciences

Key figures

3 RESEARCH AREAS

105 MEMBERS

14 STUDY PROGRAMMES



FUNDING AND COLLABORATIONS

- Acquired funding (2023-2024): € 3.8 million
- More than 40 collaborations with national and international partners

PUBLICATIONS (2023-2024)

- More than 100 peer-reviewed articles in scientific journals

Life Sciences

Editorial

The years 2023 and 2024 have been particularly fruitful for us. Thanks to the dedication and perseverance of our scientists, we have successfully launched new projects spanning both fundamental and applied research. We have investigated critical aspects of cancer biology, providing new insights into the molecular mechanisms of carcinogenesis and drug resistance, while paving the way for innovative cancer therapies. In tandem with our research advancements, our educational programmes have expanded significantly with new training programmes in nursing sciences.

Looking ahead, our primary focus over the next years will be on restructuring our department, which encompasses three key areas: Life Sciences, Medicine, and Nursing/Midwifery/Allied Health professions. The training of health professionals is a national priority, and we are committed to developing and consolidating high-quality educational programmes within the health sector while fostering meaningful interactions among students across these diverse disciplines. Additionally, we aim to develop our research activities within these domains, leveraging the advantages of interdisciplinary cooperation.

More information: dlsm.uni.lu

Iris Behrmann

Serge Haan

Staff

PhD & Postdoc stories

Danielle Bruno

Experience at University: Danielle focused on understanding epigenetics and gene expression changes in patients with a specific subtype of epilepsy. She utilised brain tissue samples collected during surgery.

Current position: Marie Skłodowska-Curie Postdoctoral Researcher, University of Medicine and Health Sciences of Dublin

Danielle Bruno

Borja Gomez Ramos

Experience at University: By using induced pluripotent stem cells, he identified new regulators involved in the differentiation of human dopaminergic neurons. These neurons are implicated in human diseases such as Parkinson's disease.

Current position: postdoctoral researcher at Novartis

Borja Gomez Ramos

Research

Innovative strategies to increase immunotherapy

Immunotherapy, particularly immune checkpoint inhibitors (ICIs), represents one of the major advances in oncology over the past decade. However, many cancer patients do not respond to ICIs. Recent research has identified the microbiome as a potential underlying factor contributing to resistance against these therapies.

Consequently, researchers are exploring various strategies to harness the microbiome in order to enhance response rates to ICIs. Diet is a known regulator of the microbiome and may play a significant role in the efficacy of cancer therapies, potentially through modulation of the immune system. However, dietary guidelines are often poorly implemented in current cancer treatment plans.

"We will conduct a clinical randomised crossover study involving cancer patients undergoing ICI treatment, as well as utilise humanised mouse cancer models to examine the effects of fiber supplementation on therapeutic efficacy and host-microbiome interactions," explains Prof. Elisabeth Letellier, co-head of the Molecular Disease Mechanisms group and leader of the project.

More information about the project PREImuno2

Understanding drug resistance mechanisms

Recent advancements in cancer biology and immunology have transformed melanoma treatment. However, resistance to therapies remains a significant challenge. Understanding the molecular mechanisms behind this resistance is essential for developing more effective treatments, particularly for patients with the "NRAS genetic subtype."

Researchers at the University have investigated the drug resistance mechanisms in NRAS mutant melanomas and have demonstrated that the ATP-gated ion channel P2RX7 is transiently increased in melanoma cells undergoing treatment. This expression returns to baseline once the cells adapt and subsequently tolerate drug treatment, as evidenced by their re-entry into the cell cycle and resumption of cell growth.

"Our results indicate that high levels of active P2RX7 could serve as a useful marker for a general response to treatment in NRAS melanoma cells, since P2RX7 levels decrease in cells that have become resistant to therapy," says Prof. Stephanie Kreis, co-head of the Signal Transduction group.

The paper was published in the journal Cell Reports in July 2023.

Studies

New Master in Molecular and Computational Biomedicine

The Master in Integrated System Biology has been reoriented to the Master in Molecular and Computational Biomedicine (MMCB). This programme equips students with an in-depth understanding of biosciences and complex diseases, leveraging cutting-edge experimental and computational methodologies.

The curriculum encompasses essential knowledge in biomedicine and advanced technologies, through hands-on experimental and computational exercises across various practical teaching units. Graduates will be prepared for a career as a biomedical researcher and other related roles.

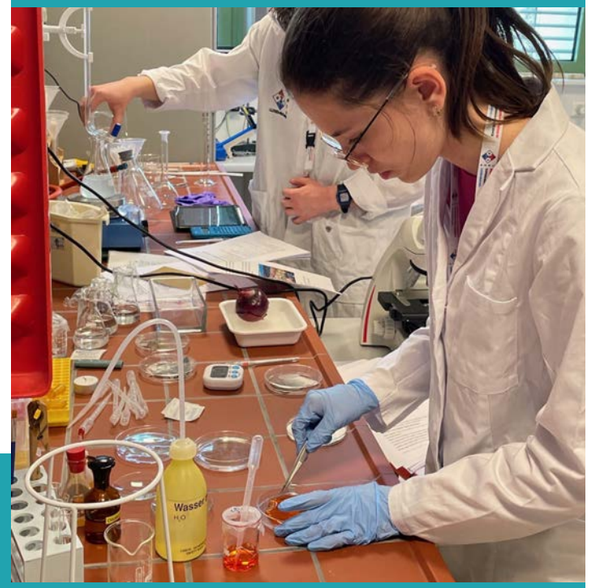
mmcb.uni.lu

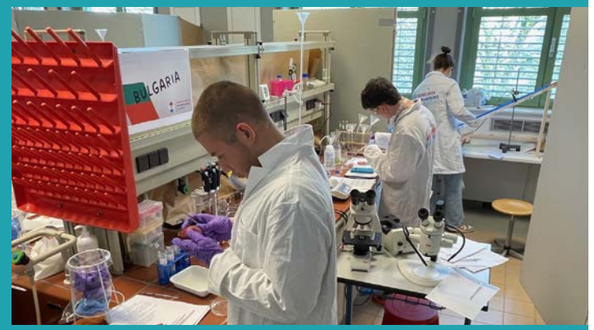
Outreach

European Olympiad of Experimental Science (EOES)

The University actively participated in welcoming the European Olympiad of Experimental Science (EOES) in Luxembourg in April 2024. The event welcomed almost 140 secondary school students coming from 24 countries who participated in the final competition to solve tasks in the fields of biology, chemistry and physics.

The main objective of EOES is to challenge and stimulate gifted science students, helping them to develop their talents and promoting their future scientific careers. "EOES allows top young science students from across the European Union to meet; it also aims to promote a positive and high-profile image of science and scientists among the wider community", comment Dr. Alexandre Salsmann, Head of the scientific committee and Prof. Paul Heuschling, President of the jury.





Medicine

Editorial

In 2023-2024, the University continued to expand its medical activities. The recruitment of new professors and collaborators has brought diverse expertise and innovative teaching methods as well as has facilitated the launch of new research projects such as STEPCARE, FastCOV.

At national level, the development of partnerships with hospitals and healthcare actors offers more internship opportunities while at international level, new exchange programmes have been established for student mobility.

The University has also invested in new cutting-edge equipment within the Health Simulation Unit (SimUL) providing students with a realistic and immersive learning environment.

In 2023, the University reached a significant milestone by graduating its first cohort of students from the Bachelor in Medicine. This achievement marks a pivotal moment in the university's history and the country's medical education landscape.

Pascal Stammet

Staff

Academic promotion

Maria Angeliki Pavlou appointed research scientist

Maria joined the University in 2018 as a postdoctoral researcher. She then progressed through the roles of project manager and team coordinator before being appointed as a research scientist and Deputy Director of the Bachelor in Medicine in 2024.

New professors

Jean-François Michel

Jean-François Michel joined the University as an Assistant Professor in General Medicine in January 2024. He is the Study Programme Director of the "Diplôme d'Etudes Spécialisées en Médecine Générale" . Having completed his medical training at renowned institutions, he has spent several years working in various healthcare settings, where he honed his skills in patient care and medical management.

Pascal Stammet

Pascal Stammet joined the University as Affiliated Professor of Medicine in April 2024 and as of September 2024, he has been Study Programme Director of the Bachelor in Medicine. Pascal is a medical doctor specialised in anesthesia and intensive care medicine. Among other objectives, he aims to bring clinical research forward at the University and foster the translational link between clinical research (bed side questions) to laboratory research.

Maria Angeliki Pavlou

Jean-François Michel

Pascal Stammet

Research

Fasting: new promising treatment for long COVID

Long COVID syndrome occurs in up to 10% of cases and represents a significant threat to public health. The duration and severity of long COVID vary widely. Among the most common symptoms are fatigue, shortness of breath, pain, and cognitive impairment, which can significantly affect daily activities and quality of life. While promising pharmaceutical interventions are in development, their efficacy remains unproven.

Researchers at the University explore "fasting" as an effective treatment option for long COVID syndrome by investigating the effects of a calorie restriction regimen on symptoms. They also analyse if the potential benefits of fasting can be maintained over a longer period of time. The results of this study could lead to the development of tailored interventions for this complex condition.

"This study investigates the potential effect of fasting on the symptoms of long COVID syndrome and how it can improve the health and quality of life of patients", mentions Prof. Jochen Schneider, leader of the project assisted by Prof. Paul Wilmes, Dr. Marta Sanchez Castro and Dr. Maria Angeliki Pavlou together with external partners.

More information about FastCov

Studies

First graduates from the Bachelor in Medicine

Launched in September 2020, the University celebrated the first graduates of its full Bachelor's degree in Medicine in 2023. The 13 graduating students became pioneers, having been both students and partners in the development of this innovative curriculum. Since then, the programme has continued to experience growing success with 28 graduates in 2024. The tutoring programme is also really appreciated by the first-year students as they received help from second and third year students.

"Working in small groups and working closely with the lecturers and administrative staff enabled us to always get answers and clarify any points that were difficult to understand during our courses. In addition, the University put a lot of emphasis on practical work: we had lots of internships in hospitals, as well as practical work, simulations on mannequins, dissections and so on. At the end of my first year of medicine, I decided to give Luxembourg a chance, which was one of the best decisions I could have made!", mentions Elena Deleu, one of the first graduates.

bmed.uni.lu

Outreach

World Family Doctor Day

In May 2023, on the World Family Doctor Day, the Luxembourg association of medical doctors in specialised training (ALMEVS), together with the University and several partners from the health sector organised an event to raise awareness of primary health care and preventive medicine at Place d'Armes in Luxembourg City. From blood pressure measurement to cardiac resuscitation and the teddy bear hospital, as well as walking through a giant inflatable colon, all visitors were fully engaged. It was a great opportunity for all people interested in their health, especially to recognise the exceptional contributions that primary care and our general practitioners have made to society as a whole.

Journée du Futur Médecin

In October 2024, the Association Luxembourgeoise des Étudiants en Médecine (ALEM) organised the 'Journée du Futur Médecin' at the Lycée des Garçons in Luxembourg. On this occasion, the University informed young people about the various possibilities open to them for studying medicine, whether at bachelor level or for their medical specialisation. The University of Luxembourg was represented by Prof. Pascal Stammet, Prof. Jean-François Michel and Dr. Maria Pavlou.

Nursing Sciences

Editorial

In 2023-24, the University expanded its offer in nursing sciences with the introduction of several new Bachelors aimed at addressing the growing needs of Luxembourg's healthcare sector.

Starting in September 2023, the University launched four specialised nursing degrees: Surgical Medical Technical Assistant, Nurse in Anaesthesia and Resuscitation, Pediatric Nurse, and Psychiatric Nurse. They are designed for professionals who have already completed a degree in general nursing and wish to specialise.

In September 2024, a Bachelor of Nursing in General Care was launched combining academic training with practical experience. This Bachelor is accessible after secondary school. Two new Bachelors in Midwifery and Medical Technical Radiology will be launched in September 2025.

In parallel, research in nursing sciences is booming with the launch of several research projects such as the European project SPIRIT-4CARE and a total of 41 scientific articles in 2024.

Marie Friedel

Staff

New Professor

Ali Ghanchi joined the University of Luxembourg in September 2024 as an Assistant Professor and Director of the Bachelor in Midwifery Studies. Prior to joining the University, Prof. Ali Ghanchi worked as clinical midwife in France. His PhD thesis in Clinical Epidemiology was carried out on congenital heart defects and growth restriction in the newborn.

Ali Ghanchi

Research

Working in palliative service: challenges for nurses

Nurses in palliative care face both practical and emotional challenges. Recent research at the University explores "existential growth," where nurses find personal and professional meaning in caring for palliative patients.

Dr. Afi Agboli, postdoctoral researcher at the University, studies existential and post traumatic growth among bereaved parents and nurses. Her goal is to identify strategies, opportunities, and barriers to this growth. She won the best poster award at the 30th SFAP (Société Française d'accompagnement et soins palliatifs) congress in June 2024.

Studies

Twin a Nurse

To support the nursing students, the 'Twin a Nurse' project was launched in October 2023. This initiative offers mentoring between a professional nurse in Luxembourg and a nursing student at the University. Around forty practising nurses responded favourably and really appreciated the idea of accompanying a student.

"Various studies have shown that mentoring improves self-efficacy, self-esteem and academic success. One-to-one social support is a key element that can have a real impact on students' well-being. Offering support from experienced nurses in Luxembourg is a real opportunity for these students", emphasises Professor Marie Friedel, Study Programme Director for the specialised Bachelors in Nursing. Following the success, the initiative was reconducted in 2024.

More information: Twin a Nurse

Outreach

Statistics in the service of health: fruitful exchanges

In June 2023, the University and the National Association of Nurses of Luxembourg (ANIL) organised a conference on the importance of data culture in healthcare, highlighting the work of Florence Nightingale, the pioneering mathematician and nurse, globally recognised for her contributions. This event brought together healthcare professionals, researchers, and policymakers to discuss the pivotal role of data in transforming healthcare delivery and improving patient outcomes.

The conference aimed to highlight how a robust data culture can enhance decision-making processes, streamline operations, and foster innovation in healthcare. Keynote speakers included leading experts in data science and healthcare management, who shared insights on the latest trends and best practices.

Participants had the opportunity to engage and share their experiences to foster a data-driven culture in the health sector. The event also featured curent research projects that are shaping the future of healthcare.

Paediatric palliative care

In June 2024, the University in partnership with the Ministry of Health and the Centre Hospitalier de Luxembourg (CHL) organised a discussion day on paediatric palliative care and the implementation at national level. Nearly 80 people from academia, the health sector and government gathered on Belval campus.

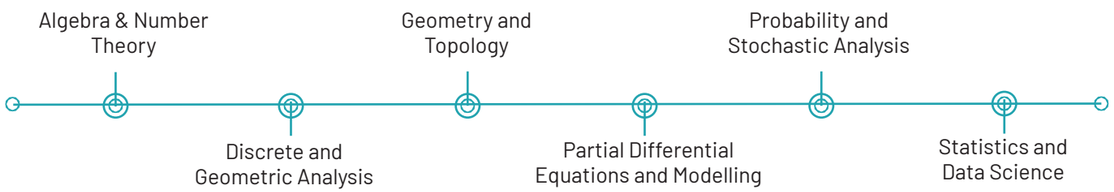
After a morning full of emotions, exchanges and discussions, the afternoon was devoted to the implementation of paediatric palliative care and paediatric respite care in Luxembourg. Ten representatives were present.

"This first scientific day brought together the key players in Luxembourg who are determined to implement the priorities announced in the cancer plan and the national paediatric palliative care plan 2023-2026 by training healthcare professionals, creating a respite home and setting up a mobile care team", enthuses Prof. Marie Friedel, who initiated the event.

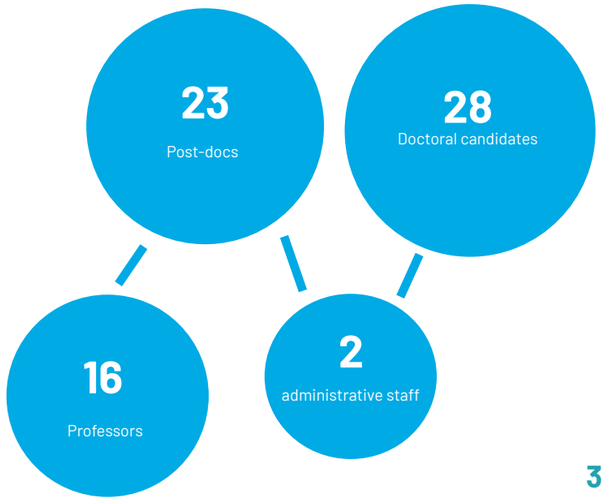
Mathematics

Key figures

6 RESEARCH AREAS



69 MEMBERS



5 STUDY PROGRAMMES

FUNDING AND COLLABORATIONS

- €3.4 million acquired in new research projects
- FNR-funded doctoral programme DTU GRACE (€1.7 million)

PUBLICATIONS (2018-2024)

- More than 400 peer-reviewed publications

Editorial

Giovanni Peccati

Over the past two years, the Department of Mathematics has significantly expanded its expertise, particularly in partial differential equations, mathematical modeling and geometry, where we were privileged to welcome Professors Franck Sueur and Karin Melnick. Our researchers have been exceptionally successful in securing competitive funding and producing high-impact publications across a wide spectrum of mathematical disciplines. A special mention goes to Jean-Marc Schlenker, recipient of the prestigious 2024 Frontier of Science Award for his groundbreaking research on polyhedra. Additionally, our professors are recognised as impactful actors in the international mathematical community, actively serving on scientific committees, editorial boards, and scientific boards and driving the development of the discipline at multiple levels.

Beyond our research achievements, DMATH has demonstrated a strong commitment to empowering early-career researchers, providing an environment where doctoral candidates and postdocs can thrive. Through mentoring, funding opportunities, and international collaborations, we have actively supported the next generation of mathematicians in developing their careers and visibility. DMATH has also played a key role in education, notably through the creation and management of successful teaching programmes, including our Master in Data Science, one of the university's flagship programmes. Moreover, we have developed an extraordinarily rich and original outreach activity, which stands out as truly unique even by global standards.

More information: dmath.uni.lu

Staff

New professors

Karin Melnick

Karin Melnick joined the University in September 2023 as a Professor in Differential Geometry. Her research is centered around the role of symmetry in differential geometry, as a framework for classifying geometric structures as well as the underlying topology of spaces. She is particularly interested in conformal geometry and in Lorentzian geometry; the latter is the setting for General Relativity.

Franck Sueur

Franck Sueur joined the University in September 2024 as a Professor in Partial Differential Equations and Analysis. His research focuses on mathematical equations that describe various phenomena which may be related to physics, biology, finance and to many other applications. Some of his favourite equations are the Euler equations and the Navier-Stokes equations, which describe the dynamics of a fluid, in time and space.

PhD & Postdoc stories

Chiara Amorino

Experience at University: Chiara developed non-parametric estimation methods for the interaction force in large-scale particle systems—an area where her work has significantly advanced the theoretical understanding and methodology.

Current position: Assistant Professor at Pompeu Fabra University in Barcelona

Andrea Seppi

Experience at University: Andrea worked on algebraic and geometric aspects of low-dimensional geometry.

Current position: Professor, University of Torino

Tara Trauthwein

Experience at University: Tara's work focused on random geometric graphs in critical regimes. She quantitatively assessed the fluctuations of random geometric structures

Current position: Postdoctoral researcher at Oxford University

Karin Melnick

Franck Sueur

Chiara Amorino

Andrea Seppi

Tara Trauthwein

Research

Statistical estimation of interaction forces in particle system models

Large particle system models play a central role in a wide range of scientific disciplines. Originally developed in physics to describe the dynamics of gas particles, these models have since found applications in economics—where they capture the behaviour of interacting financial agents—and in the social sciences, particularly for modeling opinion dynamics. A fundamental component of such systems is the interaction force between particles, which governs the system's collective behaviour.

Despite the widespread use of these models, the statistical estimation of the interaction function has received little attention in the literature. Addressing this gap, Mark Podolskij, within the framework of his ERC Consolidator Grant STAMFORD, have developed a novel statistical methodology for estimating the interaction force. The construction of the estimator involves solving a non-standard inverse problem. The theoretical analysis establishes the estimator's asymptotic properties and demonstrates its statistical efficiency.

How symmetries shape geometry

Mathematicians from Universities of Luxembourg and Strasbourg have proven the Lorentzian Lichnerowicz Conjecture for 3-dimensional analytic manifolds. This important conjecture examines whether a conformal geometry on a closed and bounded space is determined by its symmetries, or even by having just one sufficiently strong symmetry.

"In simpler terms, it's like asking whether you can identify the exact shape of an object just by knowing how it can be moved or transformed while preserving certain properties. The Lorentzian conformal structures represent an interesting boundary scenario between the Riemannian case (where the conjecture has been proven since 1970) and the higher-signature case (where it is known to be false)", explains Prof. Karin Melnick, Head of the Group Actions, Geometric Structures, and Smooth Dynamics research group and co-author of the study.

The research was published in the Journal für die Reine und Angewandte Mathematik in 2023.

Studies

Master in Data Science celebrates its first graduates

Launched in 2021, the Master in Data Science awarded its first diplomas to 14 new graduates. The Master was developed to address the escalating demand for data scientists in Luxembourg and Europe.

It delves deeply into the mathematical underpinnings of data science, furnishing students with robust scientific knowledge. "This Master programme is above all a collective adventure, with the combined efforts of the other departments and centres. Together, we have been able to offer courses covering most of the vast field of data science. This first promotion has made a significant contribution to the ongoing success of the programme through their very constructive feedback", comments Prof. Yannick Baraud, Study Programme Director.

All the graduates are forging their careers as data analysts, data engineers, data scientists, and research assistants across various sectors, both in Luxembourg and internationally.

mads.uni.lu

"I really appreciated the diversity of courses and the possibilities to practice technical aspects, learn about the theory, and discover different areas of application in medicine, business and statistics. Practicing and working during projects allowed me to work more independently and on various topics. This adaptability helped me on the first steps in my new position and enabled me to get projects with higher responsibilities quickly".

Maxime Wendling, Junior Underwriter at Dennemeyer

Mathematical Careers Day

Since 2018, the University organises a yearly event to give an overview of the career opportunities with a degree in mathematics. Over the years, the event has attracted an increasing interest among current, future and former students.

The sixth edition of the Mathematical Careers Day took place in October 2024 with more than 90 participants on Belval Campus. "It was a great opportunity for current students to get an idea of the variety of jobs and exchange with alumni and potential recruiters. The alumni shared their passion and choice to study mathematics, how they managed to find their first internships and/or jobs and gave their advice to the audience", comments Prof. Gabor Wiese, Study Programme Director of the Master in Mathematics and initiator of this event.

mathcareers.uni.lu

Outreach

GEM Day 2023: empowering young women in mathematics

The third edition of the GEM (Girls Exploring Math) Day marked a significant step toward gender equality in Science, technology, engineering, and mathematics (STEM), bringing together more than 230 girls from 11 secondary schools in Luxembourg. Held on Belval Campus, this impactful event coincided with the International Women in Mathematics Day and provided crucial opportunities for young women to challenge stereotypes in the field.

Throughout the day, participants engaged with mathematics beyond traditional classroom settings through the "Unpuzzling Mathematics" workshop, performed in the mathematical play "Codée," joined an infinity flashmob, and connected with professional mathematicians to discuss diverse career paths and opportunities in the field. "We were a bit overwhelmed but super happy that so many students showed up", remarked Prof. Hugo Parlier and Prof. Bruno Teheux, highlighting the need for improved gender equality in mathematics.

This yearly initiative represents an important contribution to addressing the persistent gender gap in STEM disciplines, giving young women the space and encouragement to envision themselves as future mathematicians and scientists.

Math Day 2024: more than 100 high school students passionate about mathematics

The third edition of the mathematical competition and workshop Math Day, which took place in February 2024 on Belval Campus, gathered more than 100 high school students passionate about mathematics.

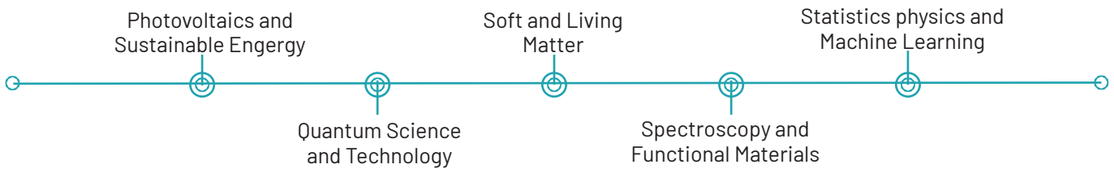
During the morning, students participated in a two-hour competition consisting of small but challenging problems. In the afternoon, the students had the opportunity to learn some new mathematics by taking part in workshops according to their category (Junior, Intermediate, or Senior).

"By participating in competitions and training for them, young students learn mathematics that they do not encounter in school, and this is a real advantage for their future," comments Prof. Antonella Perucca, Head of the Number Theory and Arithmetic Geometry research group and Study Programme Director of the Master in Secondary Education – Mathematics, who initiated the competition. "Our event is multilingual and inclusive, and in particular, it is a way to support talented girls in STEM."

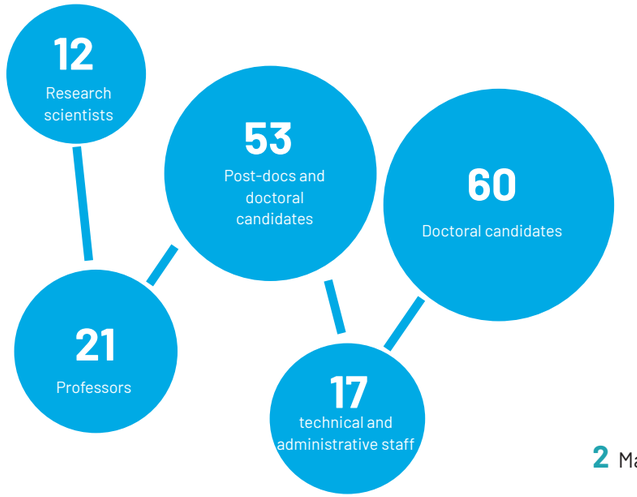
Physics and Materials Science

Key figures

5 RESEARCH AREAS



163 MEMBERS



5 STUDY PROGRAMMES

FUNDING AND COLLABORATIONS

- 18 € million acquired in new research projects in 2023-2024
- 8 FNR ATTRACT fellows since 2010
- 4 ERC grant holders, including 1 Advanced and 1 Synergy
- 3 ERC proof-of-concept grants and Luxembourg's first EIC grant

PUBLICATIONS (2024)

- Peer-reviewed articles in scientific journals (2024): 133

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Editorial

In 2023-2024, the Department of Physics and Materials Science (DPhyMS) embarked on an ambitious consolidation phase, reinforcing its commitment to excellence in research, innovation, and education. The department continued its successful trajectory, making significant strides in fundamental and applied research.

DPhyMS remained deeply invested in pioneering discoveries, with research published in top-tier international journals. These achievements led to multiple prestigious grants, including ERC awards, EU funding, FNR grants, and funding from pharma and deeptech companies. Notably, the department secured the first in Luxembourg ERC Synergy Grant, two doctoral training units from FNR, and four projects with the Institute for Advanced Studies (IAS), strengthening its position in scientific excellence.

Beyond academia, the department enhanced its partnerships with local and international industries, fostering collaborations in quantum materials, sustainable energy, and nanotechnology.

The Scienteens Lab Physics initiative expanded, welcoming nearly 1,000 high school students for laboratory workshops. Additionally, the lab launched its first sustainability-focused pilot project for adults, which will be expanded due to its success.

With a strong foundation and clear vision, DPhyMS remains at the forefront of scientific discovery, committed to shaping the future through research, education, and innovation.

More information: dphyms.uni.lu

Alexandre Tkatchenko

Daniele Brida

Staff

Academic Promotions

Andreas Michels

Andreas Michels joined the University in March 2010 as an FNR ATTRACT Fellow. His research focuses on magnetic materials and neutron scattering, with a seminal monograph published by Oxford University Press. Andreas has significantly contributed to the teaching activities in both Bachelor's and Master's programmes, covering subjects such as classical mechanics, electromagnetism, optics, or more specialised courses in magnetism and scattering techniques. He served as Master's programme director from 2015 to 2020 and has been Deputy Head of the Department of Physics and Materials Science since 2021. In January 2023, he was promoted to Full Professor.

Anupam Sengupta

Anupam Sengupta joined the University in May 2018 as an FNR ATTRACT Fellow and Head of the Physics of Living Matter Group. His research integrates physics, biology, engineering, and data science to study biological systems in dynamic environments. He teaches across all academic levels, offering courses such as Physics of Living Matter and Quantitative Image Analysis. Since 2021, he has been the Study Programme Director for the Bachelor in Physics. He also holds key institutional roles, including as a member of the IAS Scientific Council and University Biosafety Committee. In May 2023, he was promoted with tenure to Associate Professor.

PhD & Postdoc stories

Oskar Prosniak

Experience at University: Oskar studied how complex physical systems relax over time, especially when they retain some memory of their initial state, using mathematical tools. In 2024, he received an FNR CORE Junior grant to support his research.

Current position: Research scientist, University of Luxembourg

Anjali Sharma

Experience at University: Anjali studied liquid crystals in spherical geometry. She used microfluidic techniques to confine the crystals in shell geometry so they can be used in bio or chemo sensing.

Current position: Senior Editor, Nature Communications, Berlin

Andreas Michels

Anupam Sengupta

Oskar Prosniak

Anjali Sharma

Research

Towards robust quantum computation

Physicists from the Universities of Luxembourg, Palermo and Tokyo with the Max-Planck-Institute Germany have investigated how topological photonics and quantum optics are poised to revolutionise quantum technologies across industries, offering resilient circuits and precise manipulation of quantum states. These advancements bolster device reliability, minimise losses, and pave the way for smaller, more efficient quantum devices.

The emerging quantum technologies and exploration of new physics require the ability to engineer quantum simulators described by Hamiltonians of many microscopic degrees of freedom, such as atoms, with desired features. However, much remains unknown in this regard.

"In this work, we explore coupling atoms to photonic structures, facilitating inter-atom communication through photon-mediated interactions. By establishing general criteria for designing atomic topological states within topological photonic structures, our work holds promise for robust quantum computation using quantum nanophotonic devices", explains Prof. Aurélia Chenu, Head of the Quantum Dynamics and Control research group at the University and co-author of the study.

Their findings were published in the journal Nature Communications in 2024.

Making thin film solar cells more efficient

They are popping up on roofs and car parks all over the world: photovoltaic panels are becoming increasingly important in the race for renewable energy. This technology, based on the conversion of solar energy into electrical energy, sees a fast development of its performance. These currently have a shortcoming: the electrons generated by the light are lost at the surface of the metal. While manufacturers have solved the equation for conventional solar cells by placing a perforated oxide layer between the active part of the solar cell and the metal contact, the problem remains unresolved for thin film solar cells.

Physicists at the University, together with researchers from the Luxembourg Institute of Science and Technology (LIST), have developed a structure that keeps the electrons away from the metal contact while allowing the electric current to pass through.

"This breakthrough is a real game-changer for the thin film solar cells, as it allows to reduce the thickness without losing power conversion efficiency, thus lowering the production costs", explains Prof. Susanne Siebentritt, Head of the Laboratory for Photovoltaics and co-author of the study.

Their findings have been published in the journal RRL Solar in 2024.

Studies

Lanners Prize for best thesis in physics

Julien Cornelius, who did his Bachelor and Master studies in physics at the University of Luxembourg, received the Lanners Prize during the Graduation Ceremony which took place in December 2024 on Belval Campus. This prize is awarded by the Fondation Nicolas et Jean-Paul Lanners to celebrate outstanding work in the field of physics.

Julien delved into complex systems and more specifically non-Hermitian quantum physics, a rich field showcasing numerous novel out-of-equilibrium phenomena enabled by dissipation and the absence of energy conservation. He explored the interplay between non-Hermitian dynamics and quantum chaos, focusing on the experimentally feasible regime of balanced gain and loss, where the dynamics becomes nonlinear in the quantum state. He discovered that this regime offers a physical method to achieve the type of spectral filtering in the laboratory that is common in theoretical and numerical studies of complex many-body quantum systems.

His findings not only demonstrate the enhancement of quantum chaos in an open dissipative system as a groundbreaking discovery that challenges the current state of the art, but also offer an experimentally feasible physical method to implement spectral filtering in complex many-body systems, whether chaotic or not.

"During the development of the project, Julien Cornelius stood out as an incredibly mature and engaged collaborator, with the natural ability to pursue cutting-edge research. His performance has been dazzling, and comparable to that of a matured doctoral candidate", comments Prof. Adolfo Del Campo who supervised both his bachelor and master theses.

Mael Guennou, Study Programme Director of the Master in Physics was really impressed by his tremendous work: "Julien successfully defended his research project in theoretical physics, earning the highest possible mark of 20. This achievement capped off a consistently excellent academic record, reflected in his outstanding average grade of 19.1/20. Despite his clear preference for theoretical physics, Julien also excelled in our more applied and experimental subjects, many of which are mandatory in our programme. This demonstrates his broad curiosity and remarkable ability to tackle a wide range of problems".

University of Luxembourg | FSTM - Faculty of Science, Technology and Medicine | Highlights 2023-2024

Outreach

SCIENTEENS LAB
DE LABO FIR JONKER

Physics and Sustainability

In 2023-2024, four new workshops in physics and sustainability were launched as part of the Scienteens Lab, the first educational laboratory for secondary school pupils in Luxembourg and the Greater Region.

In total, 37 workshops have been carried out with 919 students. In addition, 9 students participated in the summer scienteens academy on sustainability in 2024 to exchange about the future of our planet, renewable energies and climate change

High-tech research for better solar cells

Solar energy is everywhere but how can we use it? How does a solar cell work? How can we measure its efficiency and use it to power appliances we use daily? Students get the opportunity to discover the answers to these exciting questions. They get a better understanding of the current research on solar cells and find out why different solar cell technologies exist.

Renewable energies

How much energy do we use? Does our lifestyle affect the amount of energy we need? Could renewable technologies provide for all energy needs in Luxembourg? Students search for answers using a self-assessment process and carrying out hands-on experiments. At the end of the day, they will be able to answer these questions through their own investigations.

CO_2 and albedo in the context of climate change

Students learn about CO_2 as well as the albedo and greenhouse effects in the context of global warming. They discover properties of infrared radiation, learn ways to trap it and its relations to the greenhouse effect.

I've got the power!

Students explore power management, efficiency and energy storage. They carry out a series of experiments to discover how basic concepts in physics – such as force, work, energy and power – relate to real-life problematics.

More information: scienteenslab.uni.lu

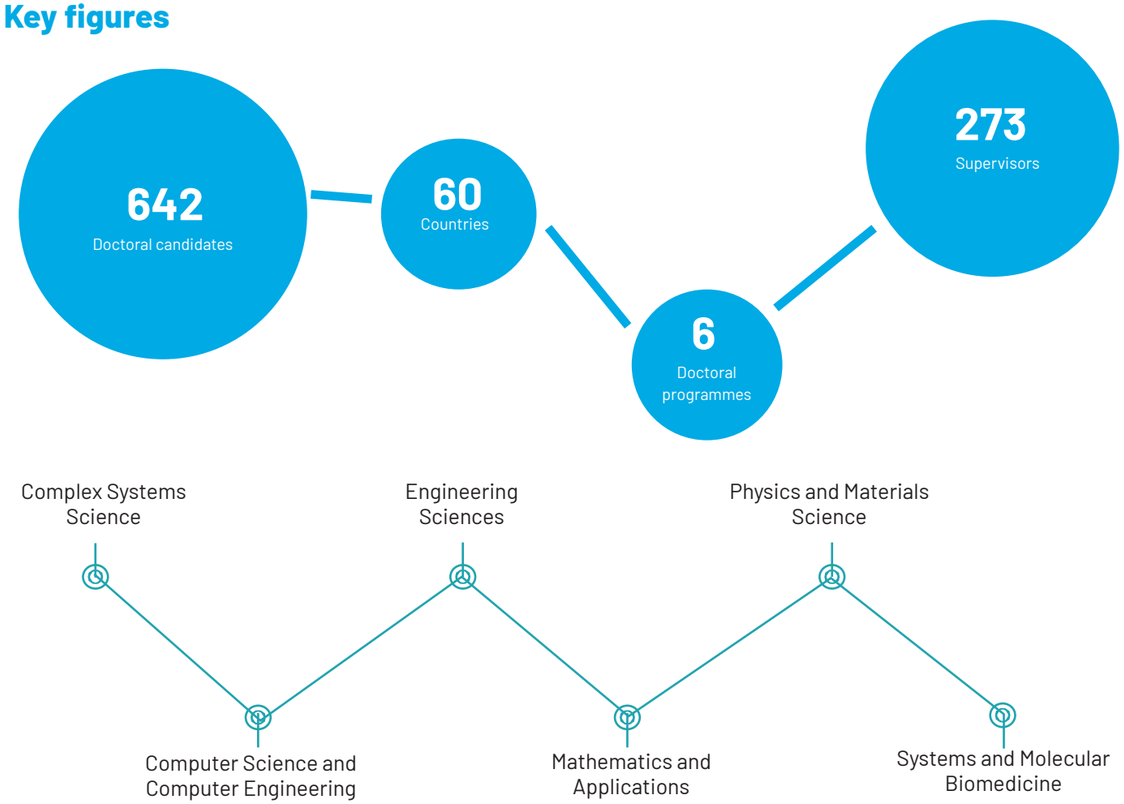
© Scienteens Lab

© OlliEickholt@Kontext

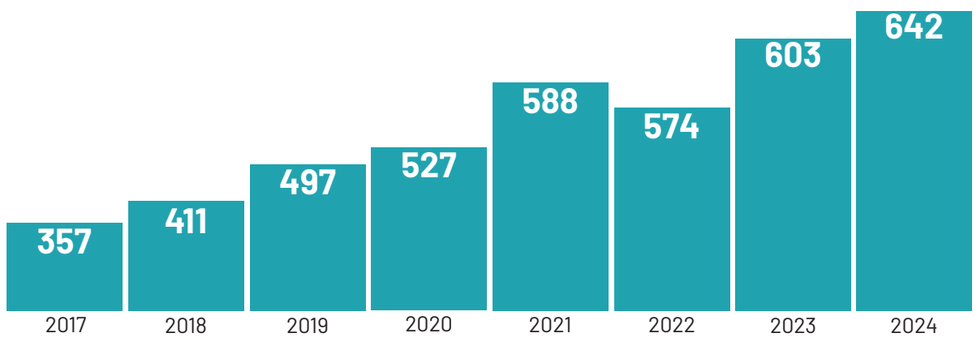
© Scienteens Lab

Doctoral School in Science and Engineering

Key figures



Evolution of the number of doctoral candidates



Editorial

The Doctoral School in Science and Engineering (DSSE) is the largest doctoral school at the University of Luxembourg with close to 600 enrolled doctoral candidates. The DSSE organises training and education of young researchers within scientific disciplines such as mathematics, physics, engineering, computer science, computational and life sciences. We aim to ensure the highest possible scientific level among the next generations of researchers. The DSSE provides training for doctoral candidates in required scientific skills as well as complementary competencies and transferable skills.

The PhD projects generally last three to four years and include an independent research project, stays at other/international research institution(s), PhD level courses, teaching and other types of knowledge dissemination. The PhD is concluded by writing and defending a PhD thesis in front of an international jury of experts from the research field.

Doctoral candidates of the DSSE are central actors of the research conducted at FSTM laboratories and departments. Progress of research projects and programmes often heavily rely on the motivation, perseverance, creativity and hard work that doctoral candidates dedicate to their projects. The DSSE provides the organisational backbone to all activities required to complete a PhD life cycle. We are dedicated to providing the best possible organisation and administration so that students can concentrate on becoming independent researchers with excellent skill sets.

More information: dsse.uni.lu

Stephanie Kreis

Activities

PhD Research Days

In 2023-2024, the University organised several research days to present current research projects and bring researchers together in the fields of biomedicine, computer science, engineering and physics. During each day, the programme was composed of keynote speeches, poster sessions, a general assembly, an award ceremony and a social event.

The PhD Days represent an exceptional opportunity for doctoral candidates to exchange ideas, research and experiences with researchers from various fields of research. Moreover, poster presentations combined with speeches by renowned experts can help them to stay informed about recent developments in various disciplines.

Among the different outcomes, Dr. Shini Somara, Freelance Producer and Author, produced six videos highlighting research done by doctoral candidates in engineering.

First supervisors' event

In June 2023, the first supervisors' event gathered around 60 academic and administrative staff members involved in the supervision of doctoral candidates on Belval campus. After an introduction by Prof. Simone Niclou, Vice rector for Research, who thanked the organisers for this great initiative and underlined the many challenges to face in the future, Prof. Stephanie Kreis, Head of the Doctoral School, gave an overview and shared key figures about the school.

Then, each programme was presented with its own specificities by the programmes coordinators. The event concluded with a keynote speech from Nell Watson, interdisciplinary researcher in emerging technologies. A networking cocktail brought the evening to a pleasant close during which participants could exchange and foster potential collaborations.

First induction Days

To facilitate the start for its new doctoral candidates, the University hosted the first PhD Induction Days at Belval campus in September 2024. The five-day event welcomed about 90 new doctoral candidates from all doctoral schools, providing them with an intensive and comprehensive programme focused on essential soft skills for a successful doctoral journey. Beyond the training sessions, new doctoral candidates had opportunities to meet their peers, exchange ideas, and establish connections that will be valuable throughout their experience.

Awards

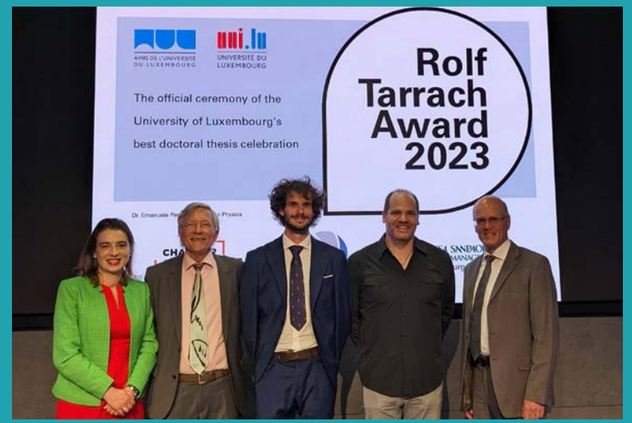
Rolf Tarrach Prize

Since its creation in 2012, the Association "Amis de l'Université" confers the Rolf Tarrach prize to one doctoral student to reward excellence in the field of research and to promote the international reputation of the University of Luxembourg.

2023

Dr. Emanuele Penocchio received the best doctoral thesis award 2023 for his tremendous work on "Thermodynamics of chemical engines: A chemical reaction network approach". He is now a postdoctoral researcher at Northwestern University.

"Thanks to his very good knowledge of the supramolecular literature, he conceived models to apply the theory and collaborated with two leading experimental groups in supramolecular chemistry", comments his supervisor Prof. Massimiliano Esposito.



© Les Amis de l'Université du Luxembourg

2024

Dr. Mina Tsenkova was awarded the Rolf Tarrach Prize 2024 for her doctoral thesis entitled "Understanding the Role of Diet and Microbiome in Colorectal Cancer". She is currently pursuing her career as postdoctoral researcher at Amgen in California.

"This outstanding achievement is a testament to her hard work and dedication, and it also underscores the exceptional quality and academic excellence of the research conducted", says Prof. Elisabeth Letellier, her supervisor.

© Les Amis de l'Université du Luxembourg

FNR Awards

The Luxembourg National Research Fund (FNR) annually presents awards to encourage communication between researchers and to promote science-related activities aimed at the general public and youth. The FNR Awards highlight such work and reward both the awardees and their institutions.

2023

In addition to the Rolf Tarrach Price, Dr. Emanuele Penocchio obtained the FNR Award 2023 for Outstanding Thesis.

During his PhD, Dr Penocchio complemented previous analyses based on kinetics and stochastic thermodynamics.

He furthermore found practical implications for designing and improving artificial chemical engines, regardless of the particular type of powering or chemical structure.

© FNR/Mich Jacoby

2024

Dr. Eleni Koronaki and her team from the University, together with Ceratizit Luxembourg, received the FNR Award 2024 for Outstanding Scientific Achievement award.

The collaborative project "Revolutionizing industrial processes: hybrid computational models for quality control, prediction, and optimization", employs a novel computational approach to improving chemical vapor deposition processes.

This work has significant implications for various industries, from semiconductor manufacturing to sustainable resource utilisation.

© FNR/Steve Ginepri

University Excellent Doctoral Thesis Awards

The Doctoral School of Science and Engineering (DSSE) awarded 10 doctoral candidates in 2023 and 12 in 2024 for their outstanding doctoral theses. Their research covers a wide variety of topics, tackling important issues and providing innovative solutions. They now continue their career in both academia and industry.

2023

Antoine ADJAOUD
Gabriel BELTRÃO
Mohaned BENZARTI
Juntong CHEN
Hao CHENG
Saurabh DESHPANDE
Daniele PROVERBIO
Jordan SAMHI
Alexej SIMETH
Mina TSENKOVA

2024

Shubhra ACHARYA
Thomas DECKERT
Salijona DYRMISHI
Florian FELTEN
Iria Carmen FERNANDEZ BOTANA
Johannes LAUR
Leonardo MAINI
Daniil NOSOV
Alfredo ROMERO GUZMAN
Tamara ROTH
Begoña TALAVERA ANDÚJAR
Tara TRAUTHWEIN

Fondation Auguste Laval Prize

The Fondation Auguste Laval Prize 2023 was awarded to Alfredo Blazquez for his thesis "Photoferroelectric effects in polycrystalline bismuth ferrite".

This thesis delves into the fabrication and study of technology-relevant functional thin films using cost-effective solution deposition methods. In his research, Alfredo focused on the ferroelectric perovskite bismuth ferrite. He investigated its potential to convert light into electricity via the bulk photovoltaic effect and to manipulate light propagation using electric fields through the electro-optic effect.

The findings not only demonstrate new routes for fabricating low-cost polycrystalline bismuth ferrite films but also highlight their potential in advanced light-driven applications such as electro-optic modulation, light-driven actuators, and holographic data storage.

Pelican Grant

To support research in the field of biomedicine, the Fondation du Pélican de Mie et Pierre Hippert-Faber finances research projects at the University of Luxembourg by giving scholarships and/or purchasing equipment in biomedicine.

In 2023, the foundation awarded seven doctoral students affiliated with the Programme in Systems and Molecular Biomedicine at the University.

Thanks to this support, the students were able to carry out additional experiments, participate in conferences and workshops or plan short-term stays abroad.

2023

Carmen LAHR
Julia ORTIS SUNYER
Najmesadat SEYEDKATOULI
Elena VALCESCHINI
Daniela Maria VEGA GUTIERREZ
Ziyun ZHOU
Elisa ZUCCOLI

Doctoral Education in Science Communication (DESCOM)

Editorial

Serge Haan

Science communication not only presents research results within the scientific community but also conveys them in an accessible way to broad audiences. In doing so, it empowers individuals to make informed decisions, supports their autonomy and independence, and ultimately contributes to the strength of democratic societies.

The Doctoral Education in Science Communication (DESCOM) focuses exactly on this: providing training to young scientists in Luxembourg in order to improve their science communication skills. The programme is open to all doctoral candidates in Luxembourg, irrespective of their field of research, and it offers courses and activities to convey theoretical knowledge as well as to provide hands-on experiences.

More information: descom.uni.lu

50 Essentials on Science Communication

The University and the Luxembourg National Research Fund (FNR) have released "50 Essentials on Science Communication", a textbook dedicated to the fascinating venture of communicating research to the public and engaging people in it.

The book's first chapters introduce fundamental concepts of science communication. The second part delves into strategic science communication, before the book gets very practical with chapters on different channels used in science communication, such as social media, podcasts, science festivals or school labs. Finally, in the last chapter the authors tackle several hot topics, among others competition in science communication, fake news, animals in research and ethical considerations in science communication.

The three editors are Jean-Paul Bertemes, Head of Science in Society at the FNR, Serge Haan, Professor for Biological Chemistry and project leader of DESCOM and Dirk Hans, lecturer in science communication. A range of 12 internationally renowned authors and 20 experts from the science communication network in Luxembourg have contributed to the multifaceted book, which covers 50 topics on 136 pages.

The book can be downloaded for free on the website of De Gruyter

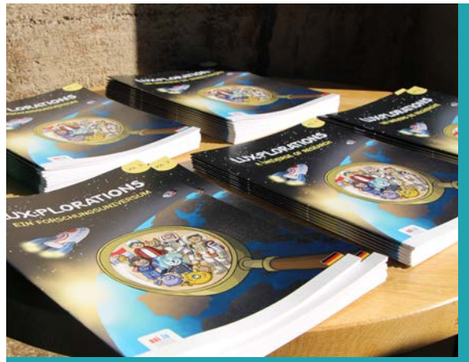
Science Comics

The third volume of the University of Luxembourg's science comic series "LUX:plorations – A Universe of Research" was published in September 2023, featuring stories about the use of artificial intelligence in energy girds, ADHD, fashion and psychology, quantum physics and how virtual reality influences our perception of time. They were created collaboratively in groups, each of which comprised two doctoral candidates and one local comic artist. In contrast to the first two editions, the single stories are now twice as long and connected by an overarching story.

The new comics were presented during different events such as the Luxembourg International Science Expo 2023, the Science Festival 2023, the 29th and 30th International Comics Festival in Contern, the LuxCon 2024, Comic Salon Erlangen 2024, as well as during several occasions at high schools in Luxembourg.

LUX:plorations is available for free and in five languages (English, French, German, Luxembourgish and this time also in Portuguese). Hard copies can be found in several locations, for instance in the Luxembourg Learning Centre and in the Luxembourg Science Center. LUX:plorations is supported by the Luxembourg National Research Fund (FNR).

More information: sciencecomics.uni.lu



Animated videos

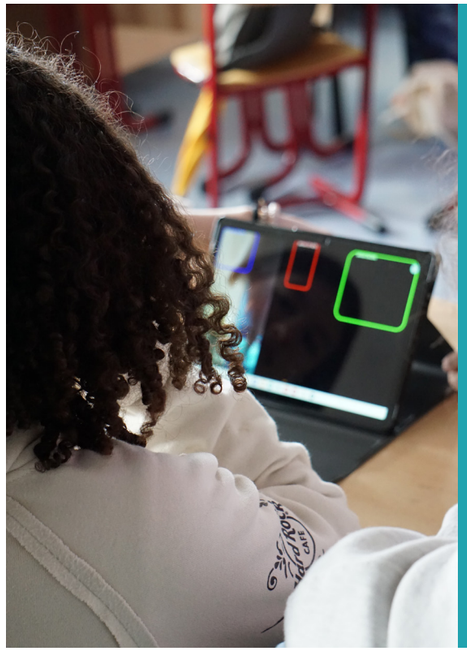
Students from the Bachelor in Animation at the University have created animated videos from the LUX:plorations comics.

You can watch them here

Science workshops

Secondary school teachers can book hands-on science workshops about different topics with doctoral candidates from the University of Luxembourg. Furthermore, teachers can download guidelines to independently conduct some of the workshops and activities with their classes. Currently two workshops are available about attention deficit hyperactivity disorder (ADHD) and brain cells.

More information: sciencecomics.uni.lu/resources



Science writing competition

Three researchers Franco Catuogno, Dr. Gabor Mihaly Toth and Dr. Carlos Vega convinced the jury and won the Science writing competition 2024 with their articles about pesticides, artificial intelligence and historical research.

Doctoral candidate Franco Catuogno won the first prize with his article "Pesticides: designed to fight pests, they became one" which deals with an issue that directly affects the general public. Postdoctoral researcher Dr. Gabor Mihaly Toth won the second prize with his article "History, loss, and your GPS: reconstructing the past" with an interdisciplinary approach to making sense of data from the past. Dr. Carlos Vega won the third prize with his article "The weakness of AI and science – explained with an omelet" where he evaluates the methodologies of trending AI solutions aimed at diagnosing important new diseases.

The competition is organised in collaboration with science.lu from the Luxembourg National Research Fund (FNR).

Science Slams

DESCOM and the student association LuxDoc asbl organise Luxembourg's Science Slam together. In this format, six scientists get the challenge to speak about their research in understandable and entertaining 10-minute-talks that are easy to follow. The audience decides who will be the winner. The events were supported by the Luxembourg National Research Fund (FNR).

"I presented my digital archaeological PhD research project which aims to recover the cultural heritage site of Tell Nebi Yunus in Mosul, Iraq. The millennia-old site was destroyed by the so-called IS in 2014. I wanted to share my thoughts on why heritage is important as well as my impressions of working in a post-conflict zone. At the same time, I focused on explaining the methodology I apply when working on the virtual 3D reconstruction of Tell Nebi Yunus."

Juan Aguilar, winner of the Luxembourg's Science Slam 2023

© LuxDoc asbl / Anne Lommel

© LuxDoc asbl / Nicla Notarangelo

"I think the Science Slam is such a good way to learn about science communication and a first hand experience on outreach presentations. Everyone has heard the word satellite at some point, but not everyone has had the opportunity to see one with their own eyes. In my research group we have developed a PocketQube, which is the size of a Rubik's cube. I wanted to take advantage of this opportunity to make space more accessible also for those who have never seen a satellite with their own eyes. So I took the satellite to the Science Slam."

Citlali Bruce Rosete, winner of the Luxembourg's Science Slam 2024

Course for PostDocs

A new course for postdoctoral researchers was developed in collaboration with ULearn, the lifelong learning programme for the University staff members, based on the successful DESCOM Science Communication Course already offered for doctoral candidates.

"The course title gives a good sense of what to expect. It provides a solid overview, introduces new concepts, and shares practical tips and techniques. The course also covers useful skills, like on how to behave in front of a camera, how to answer interview questions, how to design your webpage so journalists can find you. Overall, it's a valuable way to spend a day. Personally, I really appreciated the practical exercises. For instance, we were placed in front of a camera to conduct an interview while being filmed. Practicing this even once is far more valuable than just studying interview techniques in theory."

Ann Kieffer, Postdoctoral researcher

Celebrations

In 2023-2024, the faculty launched three new initiatives to foster exchanges and collaborations among faculty members. Firstly, the Town Hall Meeting, which takes place twice a year, is a nice opportunity for staff members to ask questions, exchange best practices, propose ideas. Secondly, the Administrative Team Retreat is also an excellent initiative enabling to meet, to discuss about current and future issues and to foster interactions among members. Thirdly, to help newcomers who join the faculty to get familiar with the organisation and the services, welcome sessions are organised every three months. Finally, the summer party is always a great moment to thank all the staff members.

Town Hall Meeting

Team Retreat

Welcome session

Summer Party

Contact

University of Luxembourg
Faculty of Science, Technology
and Medicine (FSTM)
fstm.uni.lu

Campus Belval
2, place de l'Université
L-4365 Esch-sur-Alzette

Campus Kirchberg
6, rue Richard Coudenhove-Kalergi
L-1359 Luxembourg

Campus Limpertsberg
162 A, avenue de la Faïencerie
L-1511 Luxembourg

Stay in touch

FACULTY OF SCIENCE,
TECHNOLOGY AND
MEDICINE