SCIENCE AND ARTS AT THE UNIVERSITY OF MARIBOR

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Throughout its history, the University of Maribor has built a strong research and artistic tradition, combining the originality of scientific thought and creative expression with social responsibility. Despite comparatively limited financial resources, it demonstrates high scientific efficiency and competitive research quality, reflected in publications with high scientific impact. Scientific research activities are strategically implemented through three programme cores: Artificial Intelligence and Data Science in Biomedicine, Materials and Technologies as well as Heritage Science and Climate Change. Emphasis is placed on horizontal integration and the creation of interdisciplinary synergies. Development takes place in the fields of natural sciences and engineering, life sciences, social sciences and humanities, and artistic creation. A key role is played by state-of-the-art research infrastructure, in which the University continuously invests. The University of Maribor actively develops the principles of open science, strengthens international connectivity, respects ethics in research, and involves students in research work to address social challenges and support the economic progress of the region.

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1 Introduction and General Overview

The University of Maribor is the second largest and second oldest Slovenian university, established in 1975. It comprises 17 faculties, a university library, and student dormitories. In the academic year 2024/25, it has more than 15,000 students and over 2,100 employees, including more than 1,300 researchers. Throughout its history, it has built a strong research and artistic tradition, combining the originality of scientific thought and creative expression with social responsibility.

An analysis of the trends in the number of employees and scientific publications at the University of Maribor between 2004 and 2023 (Tancer Verboten & Korošak, 2025) shows that the number of higher education teachers and researchers was strongly influenced by external circumstances, particularly the economic crisis and subsequent austerity measures, such as the Fiscal Balance Act (ZUJF) (2012), which caused a noticeable decline between 2009 and 2015, while the recovery period after 2015 enabled renewed growth (Figure 1). In contrast, the number of scientific publications recorded constant and significant growth throughout the entire period, regardless of fluctuations in staff numbers. This resilience and growth in scientific productivity can likely be attributed to a combination of increasing pressure to publish due to national and internal evaluation criteria (criteria of the Slovenian Research and Innovation Agency – ARIS, habilitation requirements) and the continuous availability of European research funding. This indicates the university's adaptability and strengthening of its research focus despite unstable staffing conditions.

This strengthening of the research focus and adaptation to international trends, reflected in the growth of publications, is also evident in the active role of the University of Maribor as a research institution involved in numerous important European networks and initiatives. These include, for example, ATHENA European University (n.d.), the European University Association (EUA) (n.d.), the European Open Science Cloud Association (EOSC) (n.d.), and the Coalition for Advancing Research Assessment (CoARA) (n.d.). Such membership and collaboration support the University of Maribor's commitment to international cooperation, interdisciplinarity, and academic freedom and autonomy, further fostering the development of its research environment and contributing to its visibility in the European area.

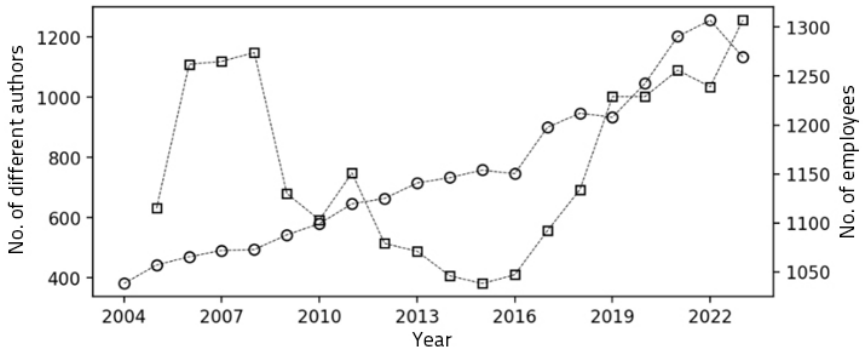

Figure 1: Trends in the number of higher education teachers and researchers at the University of Maribor (squares) and the number of published scientific articles (circles) where the first or lead author is affiliated with the University of Maribor in the years 2004–2023.

Source: (OpenAlex, University of Maribor HR database)

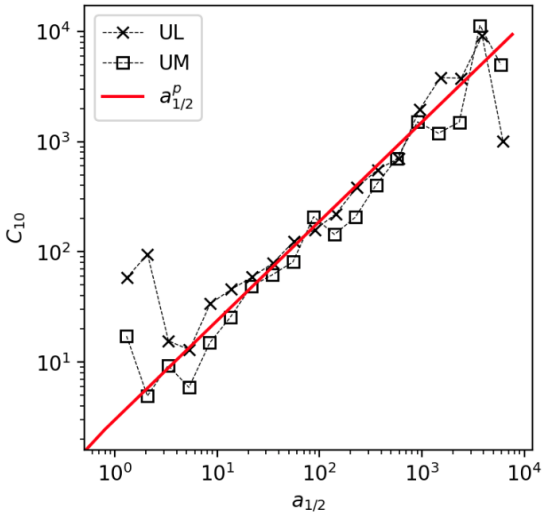

Figure 2: The ratio between SICRIS points A1/2 (a1/2) and 10-year citations (C10) for researchers at the University of Maribor (UM, □) and the University of Ljubljana (UL, ×). Values of a1/2 were grouped into 20 logarithmically evenly distributed bins. The plotted points represent the average C10 value within each bin, drawn against the geometric midpoint of the corresponding a1/2 bin, on a log-log scale. The red line illustrates a power function of the form C10 ∝ (a1/2)^0.9.

Source: (SICRIS database for the period 2018–2023)

Further insight into research performance is provided by Figure 2, which shows the relationship between SICRIS publication points (a1/2) and the number of pure citations in the last 10 years (C10) for researchers at the University of Maribor (squares) and the University of Ljubljana (crosses), with both axes on a logarithmic scale. The data, shown as the average C10 within logarithmically distributed bins of a1/2, indicate a strong positive correlation for both universities, following approximately a power law (red line, C10 ≈ (a1/2)^0.9). This means that researchers with a higher number of publication points also have, on average, a higher number of citations. The data for the University of Maribor and the University of Ljubljana follow a very similar trend, suggesting comparable dynamics between publications and their impact at Slovenia's two largest universities.

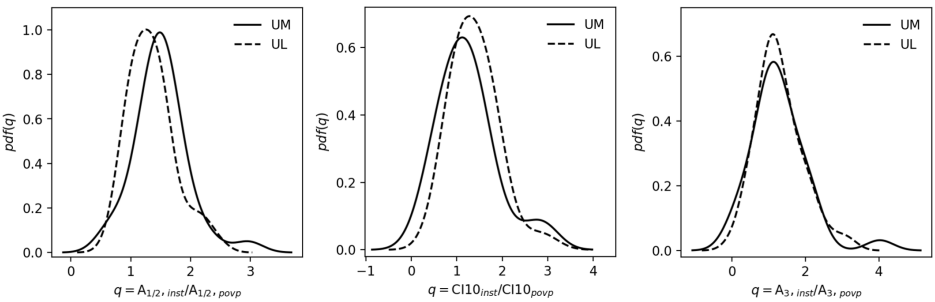

Figure 3: Distributions of ratios between SICRIS indicators (A1/2, CI10, A3) of scientific publications for the institution (UM, UL) and the national average for each research subfield according to the ARIS classification (1 represents the national average). Only fields with more than 20 researchers at the institution were considered; all indicators are expressed per number of researchers. Shown are kernel density estimation functions of the distribution histograms.

The analysis of the distributions of ratios between SICRIS indicators (A1/2, CI10, A3), presented in Figure 3, reveals similarities in scientific productivity among researchers at the University of Maribor and the University of Ljubljana relative to the national average horizontally across all fields. The distinct overlap of kernel density distributions for all three indicators indicates a comparable level of scientific excellence at both universities. This noticeable convergence in scientific productivity is not coincidental but is most likely the result of long-standing evaluation of research performance through publication metrics, which has gradually led to practically equalized research output per researcher. The results empirically support the thesis that systematic assessment of research work through bibliometric

indicators has created an environment in which research practices at both universities have been optimized to such an extent that today they produce remarkably similar results, consistently exceeding the national average.

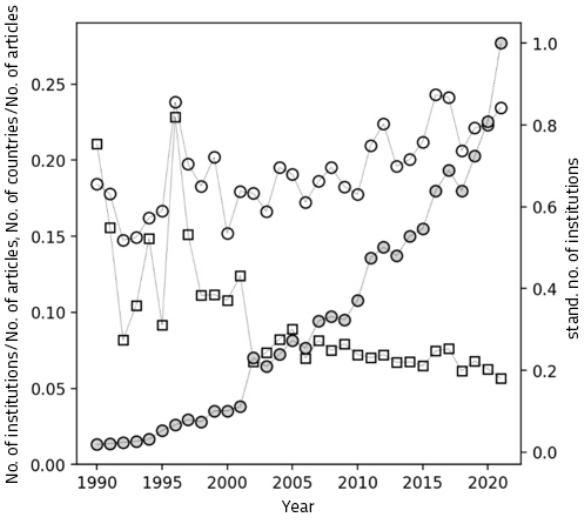

Figure 4: Dynamics of international collaboration of the University of Maribor in scientific production during the period 1990–2021. Shown are trends of the normalized number of unique co-author institutions (grey circles), the ratio between the number of unique institutions and the number of published articles (empty circles), and the ratio between the number of countries and the number of published articles (squares).
Source: (OpenAlex)

The analysis of the University of Maribor's international engagement during the period 1990–2021 reveals a pronounced trend of strengthening connections with the global research area. As shown in Figure 4, the number of unique international institutions with which the University of Maribor collaborates in publishing scientific articles (represented by grey circles) has experienced dramatic growth. In the early 1990s, collaboration with international institutions was still in its initial phase, while after 2000 we observe accelerated growth.

The dynamics of the ratio between the number of unique institutions and the number of published articles (empty circles) indicates increasing efficiency of international collaboration. The University of Maribor is not only collaborating with an increasing number of institutions over the years but is also increasing the number of co-authored publications with existing partners. This transformation reflects the

University of Maribor's strategic orientation toward the internationalization of research work and demonstrates successful integration into the international scientific community, which is reflected in the growing production and quality of research work. The marked increase in international collaboration after 2010 also coincides with greater involvement in European research programmes and other forms of international networking.

1.1 Strategic Research Directions

Research activities at the University of Maribor are strategically implemented (Univerza v Mariboru, n.d.-c) through three programme cores: Artificial Intelligence and Data Science in Biomedicine (Life Sciences, ERC LS), Materials and Technologies (Physical Sciences and Engineering, ERC PE), and Heritage Science and Climate Change (Social Sciences and Humanities, ERC SH). These cores represent central points around which research activities from various fields are organized and interconnected. Special emphasis is placed on horizontal integration of these areas and the creation of interdisciplinary synergies, enabling more efficient utilization of research potential, easier acquisition of international projects, and achievement of breakthrough results.

A key role in achieving strategic research objectives is played by state-of-the-art research infrastructure (Univerza v Mariboru, n.d.-d). In recent years, the University of Maribor has made significant investments in upgrading and expanding research equipment, laboratories, and other facilities, which has substantially contributed to improving the quality and competitiveness of research work.

Modern research infrastructure, including advanced computing systems for processing large databases, specialized laboratories for material research, simulation systems, and advanced analytical instruments, forms the foundation for conducting advanced research within all three programme cores. Particularly important are the IT infrastructure supporting the development and implementation of AI methods and specialized equipment for materials and technologies, which enables the development of advanced materials and technological solutions. Recently, through projects such as HPC RIVR, RIUM, and others, the University of Maribor has significantly upgraded its research infrastructure and established an open-access policy, allowing research organizations and companies to access its facilities.

The University recognizes that continuous investment in research infrastructure is of strategic importance for the long-term development of scientific excellence. In the coming period, it plans further investments in upgrading research equipment and building new research facilities within the INNOVUM Platform, with a special focus on infrastructure supporting interdisciplinary research at the intersection of programme cores. These investments will include the establishment of an Advanced Computing and AI Centre, as part of which the University is already involved in the future AI Factory within the new supercomputing centre; upgrading laboratories for materials of the future, where the University, in partnership with Elettra Sincrotrone Trieste and Graz University of Technology, is developing a new HB SAXS synchrotron beamline; and creating modern research facilities for studying climate change and preserving cultural heritage.

The University of Maribor strives for optimal utilization of research infrastructure through mechanisms of capacity sharing, open access, and collaboration with industry. Special attention is given to establishing joint research platforms accessible to researchers from various disciplines and partners from industry and other research organizations, further strengthening the university's role as a regional hub of research excellence.

Despite comparatively limited financial resources, the University of Maribor demonstrates high scientific efficiency and competitive research quality, reflected in comparable results according to staff numbers and a high share of publications with significant scientific impact. The University of Maribor successfully manages human capital, collaboration networks, and selective publishing strategies, enabling competitiveness even under financial constraints.

The University of Maribor's vision for the period 2021–2030 includes sustainable development of scientific and artistic fields, implementation of open science principles (Univerza v Mariboru, n.d.-a, n.d.-b), strengthening international connectivity, upholding ethics and integrity in research, and actively involving students in research and development activities to address current societal challenges and support the region's economic progress.

1.2 Development by Scientific and Artistic Fields

1.2.1 Physical Sciences and Engineering

In the field of physical sciences and engineering, the development of research work followed the establishment of the first technical study programmes as early as the late 1950s. With the introduction of higher levels of study in the 1970s, research activity also strengthened, gradually gaining depth and international significance.

Engineering sciences became established through research in areas such as fluid technology, welding, mechatronics, advanced materials development, energy, power electronics, robotics, and artificial intelligence. These studies are directly linked to the programme core of materials and technologies, while research in artificial intelligence also contributes to the programme core of artificial intelligence in biomedicine. Significant achievements include the development of Slovenian nanosatellites, advanced systems for automation and robotization of production processes, and innovative solutions in sustainable construction and transport infrastructure, which also contribute to the programme core of heritage science and climate change.

These accomplishments are supported by state-of-the-art technical infrastructure, including specialized laboratories for mechatronics, robotics, and artificial intelligence, advanced measuring instruments for material testing, vacuum chambers and clean rooms for space technology development, and modern simulation systems for planning sustainable construction and energy solutions. Recent investments in upgrading laboratory equipment and establishing prototyping centres have significantly increased research capacities and enabled closer collaboration with industry in developing innovative technological solutions.

Chemical research has focused on new materials, process engineering, and analytical methods, which are successfully transferred into industrial practice. In the field of energy, researchers have developed important innovations to improve energy efficiency and the use of renewable energy sources.

Natural science research has contributed significant theoretical breakthroughs and applications. Mathematicians in Maribor are internationally recognized for achievements in functional analysis, algebra, and graph theory, and their work

provides the theoretical foundation for the development of artificial intelligence within the programme core of biomedicine. Physicists have developed strong research cores in biophysics, soft matter physics, and the physics of complex systems, which are connected to the programme core of materials and technologies. Biological research has enriched the understanding of ecosystems, biodiversity, and the adaptation of organisms to changing environments, which significantly contributes to the programme core of heritage science and climate change.

1.2.2 Life Sciences

The development of life sciences at the University of Maribor represents a story of rapid growth and specialization. Researchers in the field of biology are recognised for their achievements in microbiology, botany, zoology, plant and animal physiology, ecology, and the didactics of biology and chemistry. Among the research orientations, studies of biological invasions, morphometric and taxonomic analyses of mammals, vegetation ecology, and ethological research on insects stand out in particular. An important bridge towards interdisciplinarity is provided by achievements in landscape ecology, which are based on the use of the most advanced GIS tools. The researchers also focus on studying the impacts of climate change on various organisms and habitats, as well as on conservation biology, especially research on rare plant species and grassland ecosystems, which hold key conservation value in Slovenia.

Medical research ranges from molecular genetics and physiology to clinical sciences and public health, with a special emphasis on translational medicine, which enables the transfer of fundamental research into clinical practice. These studies are central to the programme core of artificial intelligence and data science in biomedicine, where medical knowledge intertwines with advanced computational approaches for disease diagnostics and treatment.

Research in agriculture and biosystems sciences focuses on developing sustainable food production, plant and animal protection, and processing high-quality agricultural products. With its emphasis on sustainable practices and adaptation to environmental changes, this research connects to the programme core of heritage science and climate change, while the development of new biotechnologies contributes to the programme core of materials and technologies.

Health sciences have developed research approaches that combine clinical practice, biotechnology, and information technologies. Research focuses on improving healthcare, developing new medical devices and procedures, and applying advanced technologies in medicine. These studies form a bridge between the programme cores of artificial intelligence in biomedicine and materials and technologies, as they combine the development of advanced materials for medical purposes with the use of artificial intelligence for clinical data analysis and decision support. A key element of this research is specialized medical infrastructure, which includes advanced imaging technologies, laboratory capacities for cellular and molecular research, and simulation environments for testing new therapeutic approaches.

An important characteristic of life sciences at the University of Maribor is their interdisciplinarity and integration with other scientific fields, from mechanical and electrical engineering to social sciences and humanities, enabling comprehensive approaches to solving complex challenges in health, nutrition, and the environment.

1.2.3 Social Sciences and Humanities

Social science and humanities research at the University of Maribor has a rich tradition dating back to the beginnings of higher education in Maribor. The first research groups in the field of social sciences emerged as early as the 1960s, focusing on economics, marketing, and organizational sciences. As the university developed, research expanded into education, linguistics, history, philosophy, and the arts.

Contemporary social science research addresses current societal challenges, from economic transformations and legal aspects of globalization to security issues, tourism, and organizational change. This research contributes to the programme core of heritage science and climate change through analyses of the social dimensions of responses to climate change and sustainable development. Humanities research enriches the understanding of cultural, linguistic, and identity-related issues, with a strong emphasis on regional and national characteristics within the European context, representing a key element of the heritage science programme core.

Researchers in social sciences and humanities at the University of Maribor increasingly incorporate digital approaches and big data analytics into their work, opening new perspectives on social phenomena and cultural processes. This digital

approach connects with the programme core of artificial intelligence in biomedicine through analyses of healthcare systems and ethical issues in medicine. Interdisciplinary collaboration with natural sciences, engineering, and life sciences enables a more comprehensive understanding of contemporary social challenges and fosters the development of innovative solutions that transcend the boundaries of individual programme cores, creating unique synergies across different fields.

1.2.4 Artistic Activity

The development of artistic activity at the University of Maribor is an essential complement to scientific work and contributes to the university's overall mission. Artistic creation has evolved in the fields of architecture, design, visual and musical arts, and literary production.

Modern infrastructure, including digital fabrication laboratories, enables innovative artistic expression at the intersection of technology and creativity. This approach connects with the programme core of materials and technologies through the development and testing of new materials and technological solutions. Artistic activity transcends the boundaries of individual disciplines and integrates with research work in interdisciplinary projects that combine art, science, and technology, thereby contributing to all three programme cores.

Architectural creation combines aesthetic, technical, and social aspects of spatial design, with a special emphasis on sustainable approaches and regional characteristics, linking it to the programme cores of heritage science and climate change as well as materials and technologies. Artistic work in the fields of music and visual arts enriches the cultural life of the university and the wider community and contributes to the development of artistic theory and practice, with digital technologies and artificial intelligence increasingly integrated into artistic processes, creating bridges to the programme core of artificial intelligence.

A key feature of artistic activity at the University of Maribor is its connection with education and research, enabling the transfer of artistic knowledge and experience into the teaching process and the development of new methodological approaches in art pedagogy.

Planned investments in research and artistic infrastructure will enable the establishment of specialized studios, workshops, and laboratories that combine traditional artistic techniques with modern technologies, supporting not only artistic creation but also interdisciplinary research projects that integrate artistic approaches with scientific methods to address complex social and technological challenges.

1.2.5 Development of Professional Support for Research Activities

The importance of professional support for research activities in the European research area began to grow over the past fifty years due to the expansion of research activities, the increasing number of research funding programmes, their complexity in applications, financial reporting, demonstrating impact, and the demanding nature of audits, as well as the size, interdisciplinarity, and international integration of consortium partnerships.

Efforts are underway in Europe to increase the visibility and recognition of the profession of Research Manager and Administrator (RMA) and to establish a unified qualification framework for training such personnel (EARMA, European Association of Research Managers and Administrators, n.d.). This is a demanding profession requiring complex knowledge, competences, and skills across various fields in constantly changing circumstances with numerous challenges.

The beginnings of professional support for research activities at the University of Maribor date back to 1971, when the Development Department was operating. In 1982, the Service for Education and Research Activities was founded, followed by the Service for Research Activities in 1986, when the term "research activities" first appeared independently in the name of an organizational unit.

In the following decades, various organizational units were established: in 1995, the Service for the Development of Education and Scientific Research; in 1996, the Department for the Development of Scientific Research Activities; in 1997, the Service for the Development of Education and Scientific Research; and in 2005, the Development Department, which included the Service for the Development of Scientific Research and Artistic Activities.

A significant milestone was reached in 2009 with the establishment of the Department for International, Research, and Student Affairs, which included the Service for the Development of Scientific Research and Artistic Activities and, for the first time, a Project Office. This marked the first formal creation of an office dedicated to providing professional support to researchers in applying for and implementing projects funded by various European and international sources, as well as the establishment of a project database for systematic monitoring of national and international projects.

The development of professional support for research, artistic, and project activities at the University of Maribor continued through several organizational changes in the following years. In 2010, within the Department for International, Research, and Student Affairs, the need was recognized for specialization and professionalization of project support for international projects (International Project Office) and for managing the growing number of projects co-financed by European Structural Funds under national cohesion policy (Service for Efficient Use of European Structural Funds).

In 2011, the Department for Research and Arts was established, including the Service for Support to Researchers and Projects of University of Maribor members and the University Project Office. In 2018, the Service for Career Development of Students and Project Support was founded, marking the formal beginning of the University of Maribor Career Centre, although some career orientation activities for students and graduates had already been carried out earlier. By 2022, the Department for Research and Arts included three centres with support services: the Centre for Development and Support of Scientific Research and Artistic Activities, the Centre for Project Support, and the Career Centre of the University of Maribor.

Another important milestone in organizing support for scientific research activities at the University of Maribor was the implementation of the Scientific Research and Innovation Activities Act ("Zakon o znanstvenoraziskovalni in inovacijski dejavnosti (ZZrID)", 2021) in 2022, which transferred certain tasks of autonomous management of stable research funding to universities and other recipients of stable funding.

2 Historical Overview of Scientific Fields

2.1 Physical Sciences and Engineering (ERC PE)

The development of mathematics, natural sciences, and engineering at the University of Maribor dates back to 1859 with the Slovenian Theological School, with key milestones being the establishment of the Junior Technical College in 1959 and the start of classes in March 1960 in the departments of textiles, mechanical engineering, and electrical engineering. Due to the growing needs of industry for highly skilled personnel, the law on the Technical College was adopted in July 1973, enabling the implementation of the third year of mechanical engineering studies and later postgraduate programmes. Development continued with the introduction of study programmes in electrical engineering, mechanical engineering, and chemical engineering in the autumn of 1975, which strengthened the institution's research capacities. In 1995, the Technical Faculty was reorganized into four independent faculties, which, despite formal separation, maintained interdisciplinary cooperation.

In parallel with technical sciences, mathematics and natural sciences also developed. The first Doctor of Mathematical Sciences at the University of Maribor was Stane Indihar, who earned his doctorate in 1975, followed by Joso Vukman, who in 1980 published the first original scientific article in theoretical mathematics in an international journal. A significant milestone was the transformation of the Pedagogical Academy into the Faculty of Education in the mid-1980s, when the Department of Mathematics was strengthened in terms of staff, which had far-reaching consequences for the development of mathematics. Over time, strong research cores emerged at the university's faculties in the fields of functional analysis, algebra, graph theory, topology, geometry, and applied mathematics. Among the most important achievements is the theory of functional identities, which began to develop at the University of Maribor under the mentorship of Joso Vukman.

Research in physics began in 1960 with physics being taught as a fundamental subject at the Junior Technical College. A breakthrough year for the development of physics was 1986, when the Faculty of Education strengthened its staff with researchers from various fields of physics. Key roles were played by researchers such as Drago Bajc in mathematical physics, Milan Brumen in biophysics, and Samo Kralj in soft matter physics. In 1998, the accreditation of doctoral studies attracted numerous young researchers. The greatest global recognition was achieved by sociophysics

under the leadership of Matjaž Perc, who published more than 400 original scientific articles, cited over 50,000 times. Researchers in physics have developed strong ties with the Jožef Stefan Institute and the University of Ljubljana, while also representing key academic staff at numerous faculties of the University of Maribor, thereby strengthening interdisciplinarity and scientific integration.

2.2 Life Sciences (ERC LS)

The development of life sciences at the University of Maribor represents an important part of research activity, encompassing medicine and health sciences, biotechnology, and agriculture. The Faculty of Medicine was established as a research organization in 2005, when it was registered in the database of research organizations and began acquiring its own research projects. Under the leadership of Dean Ivan Krajnc and Vice-Dean for Research Dušica Pahor, the faculty advanced rapidly. The accreditation of the postgraduate programme Biomedical Technology in 2006 enabled the development of research staff, and the first doctoral dissertation was defended in the same year. By 2025, 137 students have completed doctoral studies. In 2007, the faculty began publishing an annual monograph and established the scientific journal Acta medico-biotechnica, the first medical journal published by a medical faculty in Slovenia, which has so far published 279 articles in 33 issues. Currently, the faculty hosts 10 research groups with 93 researchers and has participated in 68 European projects and 67 ARIS projects since 2006.

The tradition of the Faculty of Agriculture and Life Sciences dates back to the 1960s, when the Junior College of Agronomy was founded. In 2008, the faculty moved to Hompoš Castle in Hoče, significantly improving conditions for research work. Research is conducted in laboratories, the Botanical Garden, and on the estate of the University Agricultural Centre. A major milestone was the introduction of postgraduate studies in 2000/01 with the programme Agricultural Economics, later expanded with the programme Agronomy. To date, 13 doctoral students have completed pre-Bologna programmes, and 41 have completed third-cycle Bologna programmes. The faculty publishes the scientific journal Agricultura, established in 2002 and renamed Agricultura Scientia in 2023, with 139 articles published. In 2024, the faculty carried out 20 ARIS projects, 14 other national projects, and 5 international projects. The fundamental goal of research is the development of systems for producing safe and high-quality food in times of climate change.

The Faculty of Health Sciences established the first Institute for Nursing in Slovenia in 1996. Initially, research work was limited due to the lack of master's and doctoral programmes, as nursing was not yet recognized as a scientific discipline at the national level. The first doctoral programme in Nursing was accredited in 2016, marking a major milestone for the development of education and research. Since 2021, six students have earned doctoral degrees. Today, the faculty operates four institutes and three research groups with 41 researchers. Since 2005, the faculty has participated in 13 international projects and 10 ARIS projects. The faculty provides a stimulating research environment, including the Centre for Simulated Clinical Settings, the Centre for the Use of Augmented Reality in Healthcare, and a laboratory for microbiology and molecular biology. The faculty coordinates the programme core Data Science and Artificial Intelligence in Biomedicine, which connects various research groups and enables faster collaboration on research projects.

The study of biology and the related research work began at the former Pedagogical Academy as early as 1961. Two milestones in the development of life sciences were the establishment of the Faculty of Education in 1986 and the Faculty of Natural Sciences and Mathematics in 2006. Early research in botany and zoology, shaped by Ljerka Godicl and Marjanca Markič, has expanded and deepened significantly over the past decades, as today the work is organised within Chairs.

The Chair of Zoology focuses on taxonomic and ecological questions concerning mammals and selected groups of insects. The Chair of Animal Physiology and Ethology maintains a long tradition of research on model organisms, particularly wolf spiders, with which Dušan Devetak pioneered the field. The Chair of Geobotany is engaged in floristics, the vegetation ecology of grasslands and salt marshes, and landscape ecology, where the advanced use of GIS tools plays an important role. Under the leadership of Tone Novak, the Chair of Ecology studied subterranean ecosystems and cave fauna for many years, and today its research is primarily oriented towards interspecific interactions in the context of biological invasions. The Chair of Microbial and Molecular Biosciences is relatively new but is developing rapidly. The Chairs of Educational Chemistry and Biology Didactics build their fields at the intersection of the natural sciences and pedagogy, and under the leadership of Andrej Šorgo have achieved significant breakthroughs.

The faculty offers education at all three levels across several study programmes; at the first cycle, these include Teacher Education, Biology, and Ecology and Nature Conservation, among others. More than half of all FNM students are enrolled at the Department of Biology. Members of the department actively participate in conferences, organise international symposia, and successfully lead or carry out numerous national and European research and applied projects.

2.3 Social Sciences and Humanities (ERC SSH)

The development of social sciences and humanities at the University of Maribor represents an important pillar of academic activity, shaping the institution's distinctive identity over decades. Its roots go back to the late 1950s and early 1960s with the establishment of the Junior College of Economics and Commerce (1959) and the Pedagogical Academy (1961), which laid the foundation for the later development of social sciences and humanities. The Junior College of Economics and Commerce gradually evolved into the Faculty of Economics and Business, while the Pedagogical Academy became the Faculty of Education, which later transformed into several specialized faculties, including the Faculty of Arts and the Faculty of Natural Sciences and Mathematics.

In the field of economics, the establishment of postgraduate programmes played a key role in laying the groundwork for research activities. The Chair of Quantitative Economic Analyses became a hub for interdisciplinary collaboration between economics and mathematics, resulting in numerous applied research projects in econometrics, operations research, and financial mathematics. Gradually, research focus expanded to areas such as international business, strategic management, entrepreneurship, marketing, and sustainable development. The faculty established close cooperation with industry, enabling knowledge transfer and the development of innovative solutions for practical challenges. The creation of research institutes further strengthened scientific activity and facilitated the acquisition of national and international projects.

In the humanities and social sciences, the Faculty of Arts developed a rich research tradition encompassing linguistics, literary studies, history, art history, philosophy, sociology, psychology, translation studies, and pedagogy. Particularly significant are linguistic studies of the Slovenian language, where researchers contributed to the development of lexicography, dialectology, and corpus linguistics. Research in

German, English, Slavic, and Hungarian studies has fostered intercultural dialogue and understanding of linguistic interactions. In literary studies, research has focused on Slovenian literature, comparative literature, and literary theory, making a substantial contribution to understanding national and global literary heritage. Historical research has concentrated on regional history of Styria as well as broader areas, intercultural relations in Central Europe, and modern Slovenian history, from antiquity to the present day.

A major milestone in the development of social sciences was the establishment of the Faculty of Law in 1993, which developed research in constitutional, civil, criminal, and commercial law, with a special emphasis on European law and human rights (Univerza v Mariboru, Pravna fakulteta, n. d.). The Faculty of Criminal Justice and Security, founded in 2003, developed interdisciplinary research in criminology, security studies, and information security, combining legal, psychological, sociological, and technological approaches (Meško, 2023). In pedagogy and educational sciences, the Faculty of Education has developed innovative approaches to teaching and learning, with a strong focus on inclusive education and the use of modern technologies (Univerza v Mariboru, Pedagoška fakulteta, n.d.).

Social sciences and humanities at the University of Maribor are characterized by interdisciplinary connections, a regional approach, and international cooperation. Researchers actively participate in European research projects, publish in prestigious international journals, and contribute to the development of theoretical models and practical solutions for societal challenges. A special value lies in linking the tradition of the humanities with the challenges of the modern digital society, enabling the development of innovative research methods and approaches. The establishment of doctoral schools in social sciences and humanities has strengthened the training of young researchers, who continue and enhance the research tradition while introducing fresh ideas and approaches into research work.

3 Brief Overview by University of Maribor Members

The University of Maribor boasts an exceptional diversity of research orientations across its 17 members, together forming a comprehensive academic ecosystem. Each faculty develops its own unique research profile, with some maintaining traditions in the humanities and social sciences, while others focus on natural sciences, engineering, medicine, or biotechnical sciences. This diversity enables

interdisciplinary collaboration and knowledge transfer across fields, strengthening innovation and the university's relevance both nationally and internationally. Below, we present a detailed overview of individual members and their key characteristics.

Figure 5 shows the structural distribution of research activity across all 17 faculties of the University of Maribor, categorized by seven scientific disciplines, where the width of differently coloured segments represents the share of each discipline in the faculty's research profile. The analysis reveals a clear differentiation of faculties of the University of Maribor according to their research orientation – while the Faculty of Natural Sciences and Mathematics (FNM UM) and the Faculty of Chemistry and Chemical Engineering (FKKT UM) are strongly oriented in natural science, the Faculty of Energy Technology (FE UM), Faculty of Mechanical Engineering (FS UM), Faculty of Electrical Engineering and Computer Science (FERI UM), and Faculty of Civil Engineering, Transportation Engineering and Architecture (FGPA UM) are technically oriented. The Faculty of Health Sciences (FZV UM) and the Faculty of Medicine (MF UM) focus on medical research and the Faculty of Agriculture and Life Sciences (FKBV UM) specializes in biotechnology. Social sciences dominate at the Faculty of Law (PF UM), Faculty of Economics and Business (EPF UM), Faculty of Organizational Sciences (FOV UM), Faculty of Criminal Justice and Security (FVV UM), Faculty of Logistics (FL UM), and Faculty of Education (PEF UM). Humanities are most strongly represented at the Faculty of Arts (FF UM), while interdisciplinary research is most prominent at the Faculty of Tourism (FT UM) and FERI UM. This overview clearly illustrates both the specialization of certain faculties (e.g., FE UM is almost exclusively technically oriented, PF UM strongly social science-oriented) and the multidisciplinarity of others (e.g., FNM UM, FKBV UM, FL UM). It highlights existing interconnections and research synergies among faculties and opportunities for fruitful collaboration within the university's research ecosystem.

For a more detailed insight and comparison among University of Maribor members regarding the diversity or interdisciplinarity of their research activity, we define the interdisciplinarity measure (Q) as the product of the entropies of the distribution of research activity by scientific disciplines (H1) and research fields (H2). This is weighted by the share of scientific disciplines (w1) and the share of research fields (w2) in which the member operates, so $Q=w1 * w2 * H1 * H2$.

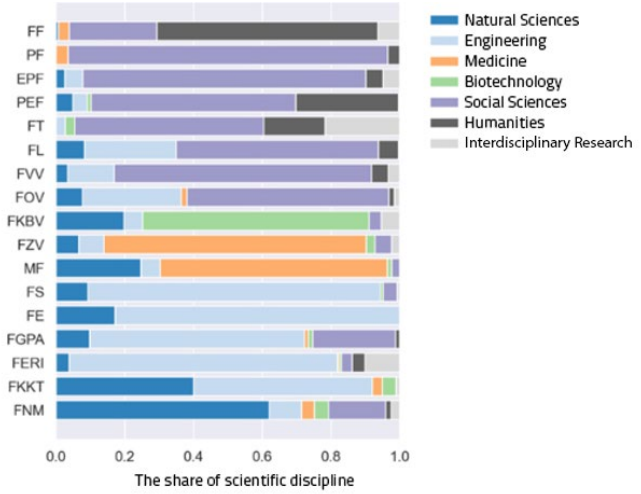

Figure 5: Distribution of research activity by faculties of the University of Maribor. The graph, in the form of stacked horizontal bars, shows the share of each scientific discipline in the research activity of each faculty. The profile of each faculty is calculated from data on the employment share of researchers at the faculty (University of Maribor personnel database) and data on the scientific discipline in which they operate (SICRIS). The legend on the right side of the graph colour codes the scientific disciplines: Natural Sciences, Engineering, Medicine, Biotechnology, Social Sciences, Humanities, Interdisciplinary research.

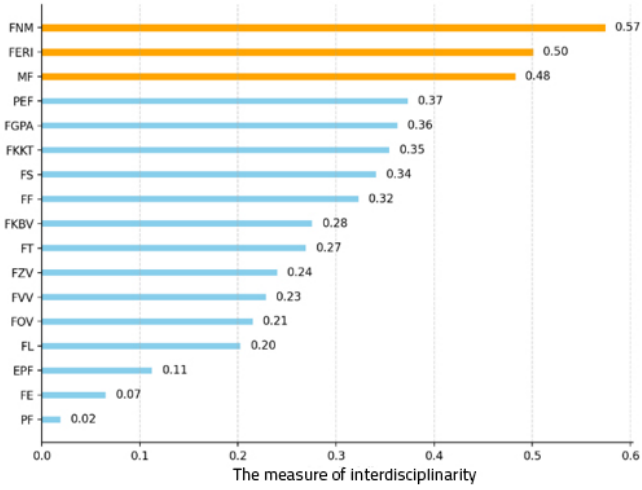

Figure 6: Comparison of interdisciplinarity among University of Maribor members. The measure of interdisciplinarity is calculated from the distribution of a member's research activity across research fields and scientific disciplines; a higher number indicates a greater degree of interdisciplinarity. The measure of interdisciplinarity is on the horizontal axis.

Figure 6 shows the interdisciplinarity measures Q for all faculties of the University of Maribor. It turns out that, according to this measure Q, the most diversified research profiles are found at FNM UM, FERI UM, and MF UM, followed by PEF UM, while EPF UM, FE UM, and PF UM are strongly focused on their core research areas. In the following sections with descriptions of faculties, we will graphically present these research portfolios for individual faculties.

3.1 Faculty of Mechanical Engineering of the University of Maribor

The scientific research activity of the Faculty of Mechanical Engineering of the University of Maribor is distinguished by more than 30 successfully implemented basic and applied projects and participation in 9 research programmes since 1999 (Univerza v Mariboru, Fakulteta za strojništvo, n.d.). Figure 7 illustrates the research diversity of the faculty across different research fields.

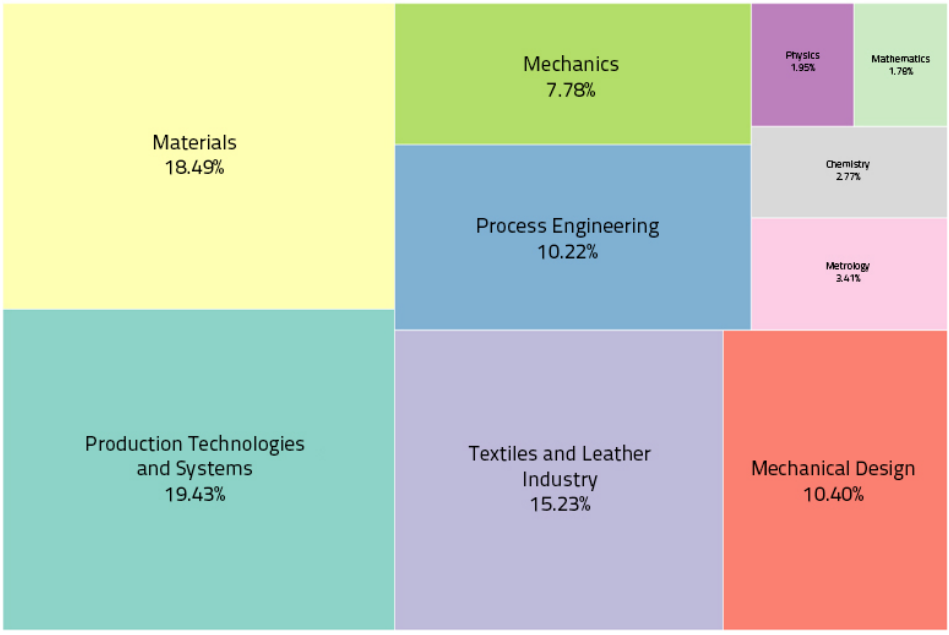

Figure 7: Distribution of research activity at the Faculty of Mechanical Engineering by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Manufacturing Technologies and Systems, Materials, Textiles and Leather, Mechanical Design, Process Engineering, and Mechanics.

The faculty's research excellence is evident in its successful acquisition of European funding from programmes FP6 (7 projects), FP7 (9 projects), H2020 (8 completed), and Horizon Europe (5 ongoing), as well as other projects. Research output includes 2,511 scientific works in the last decade, including 634 articles in recognized journals, 24 monographs, and 19 international patents. The Research Club of the Faculty of Mechanical Engineering, established in 2023, has strengthened the faculty's research capacity by promoting interdisciplinary projects and connecting young researchers, to whom the faculty has enabled the acquisition of more than 240 doctorates over the past twenty years. Modern research infrastructure forms the foundation for excellent research: a field emission scanning electron microscope – FEG SEM with EDX and SXES spectrometer, an experimental system for compounding nano- and microstructural polymer composites and metallic glasses, servo-hydraulic machines for uniaxial and flexible biaxial testing with freestanding actuators for static and dynamic tests at low and elevated temperatures, a system for characterizing zeta potential and particle size in dispersions and zeta potential on solid materials, an indentation tester, a fully automated device for coating flat substrates with various technological systems and drying methods in the same unit, etc. The Faculty of Mechanical Engineering at UM is active not only in research but also in organizing important national and international conferences. Among the most recognized events are the International Conference on Fluid Technology, the International Conference NANOAPP, Welding Technology and Industrial Robotics Day, and others that promote knowledge exchange among experts and researchers. Researchers at the UM Faculty of Mechanical Engineering are recipients of various awards and recognitions in the field of research activity.

3.2 Faculty of Electrical Engineering and Computer Science of the University of Maribor

The scientific research work of FERI UM is based on six core research programmes addressing advanced technologies of optical sensors, radar systems, electromagnetic converters, energy efficiency, and the development of digital twins (Univerza v Mariboru, Fakulteta za elektrotehniko, računalništvo in informatiko, n.d.). Figure 8 shows the research diversity of FERI UM.

The faculty's research impact is reflected in numerous internationally recognized achievements: development of miniature optical pressure sensors for USAF, contactless angle measurement devices in the Magneliq project, and patented

technologies for industry. In the CONCORDIA and CyberSec4Europe (H2020) projects, the faculty contributed to establishing the European Cybersecurity Competence Centre, developed a one-stop-shop platform for SME access to AI services (AI REGIO), and created key open-access Slovenian speech corpora, confirming its exceptional research reach. Other key EU projects include HYPSTAIR for hybrid aircraft propulsion development, ROBOTOOL-1 for cognitive robotic systems, and in H2020 Persist and HosmartAI projects, the role of artificial intelligence in medical communication and rehabilitation was explored. The INDY project (EDF) improves energy efficiency in military bases, while the NEDO project, in cooperation with ELES, developed advanced functionalities for closed-loop operation of power systems. The ARACNE project (HE) connects the European silk industry into an innovation ecosystem. FERI UM is also active in agroecological monitoring in East Africa through the PrAEctiCe (HE) project and in developing neural interfaces for rehabilitation in the HE project HybridNeuro. In the VegeLine project, they developed a tool for digital vegetation management of power lines, which received the SRIP GoDigital award. Another notable project is Audience Transformation, which analysed changes in media habits in cooperation with major Slovenian media outlets.

Significant milestones include the development of the first Slovenian nanosatellites TRISAT, launched into orbit in 2020 and still operating successfully today. Another recent achievement is the establishment of a laboratory for research and development of optical fibres with all technological processes for fibre production. The faculty achieves high international visibility in research, as confirmed by its most cited scientific article, which has more than 2,900 citations in the Scopus database. FERI UM researchers have received numerous awards and recognitions for research achievements, such as the WIPO Medal for Inventors (2025), eAward for the EduCTX digital platform (2019), ARCA Gold Medal (2020), Donald Michie and Alan Turing Award for Lifetime Achievements (2029, 2024), Danubius Young Scientist Award (2015, 2016), Excellent in Science (2013), Prometheus of Science, university awards, and others.

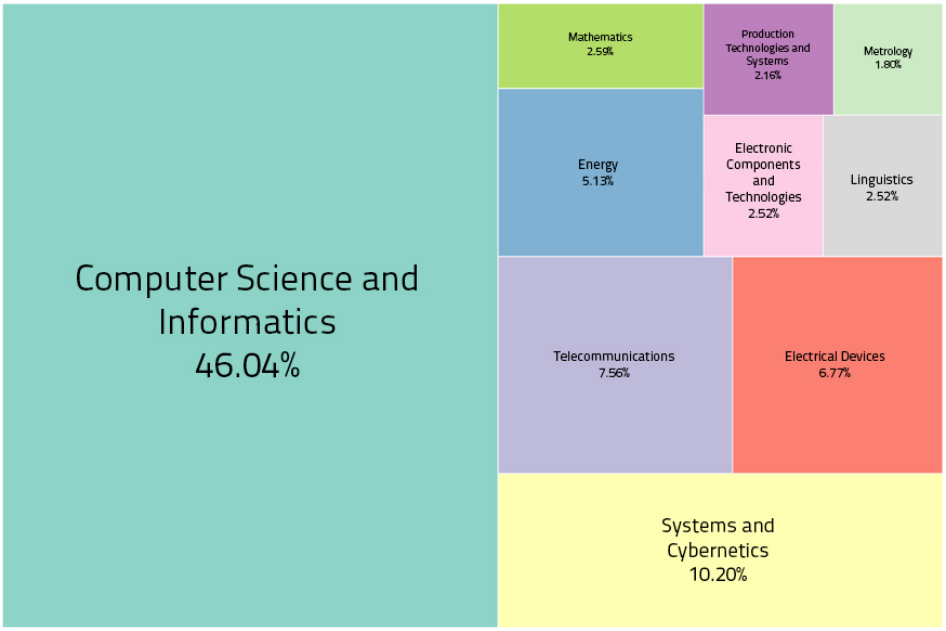

Figure 8: Distribution of research activity at FERI UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Computer Science and Informatics, Systems and Cybernetics, Telecommunications, Electric Devices, and Energy Engineering.

3.3 Faculty of Civil Engineering, Transportation Engineering and Architecture of the University of Maribor

The scientific research work of FGPA UM focuses on the core research programme Development, Modelling, and Optimization of Structures and Processes in Civil Engineering and Transport, which develops sustainable and interdisciplinary solutions. The faculty achieves international recognition through participation in European research associations EUCEET and ELGIP and by publishing the scientific journal Acta Geotechnica Slovenica, which is indexed in top scientific databases (Univerza v Mariboru, Fakulteta za gradbeništvo, prometno inženirstvo in arhitekturo, n.d.). Figure 9 shows the research diversity of FGPA UM.

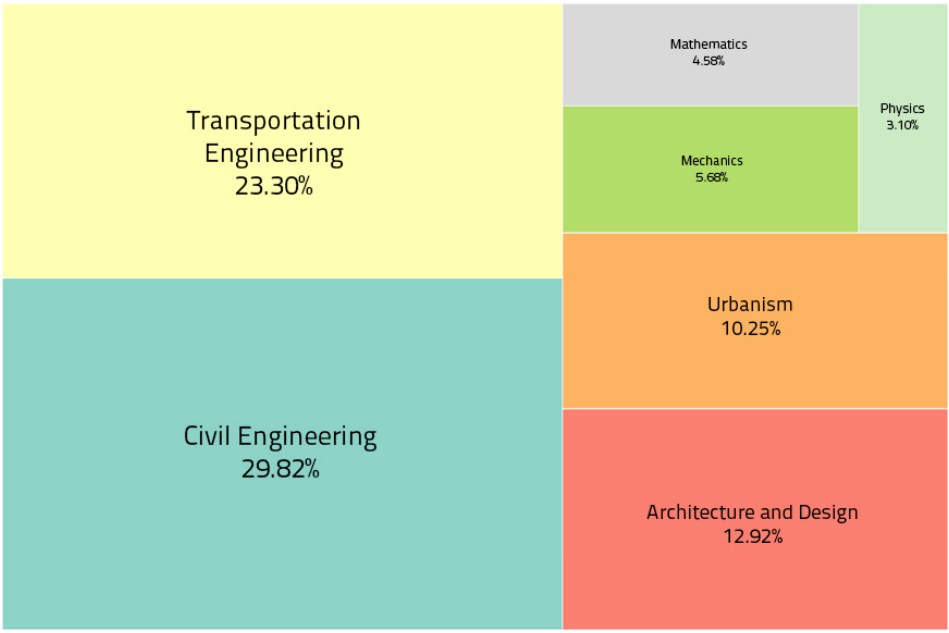

Figure 9: Distribution of research activity at FGPA UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Transportation Engineering, Civil Engineering, Architecture and Design, Urbanism, and Mechanics.

The research approach of FGPA UM is based on connecting traditional fields of civil engineering and transport with innovative approaches in architecture, enabling the development of comprehensive solutions for complex spatial challenges and the circular economy.

Researchers at FGPA UM are recipients of awards and recognitions in research, such as Excellent in Science, Zois Award, Plečnik Medals, university awards, and others.

3.4 Faculty of Chemistry and Chemical Engineering of the University of Maribor

The scientific research activity of the faculty is carried out in eleven research groups organized into nine programme groups, which in 2024 alone led or participated in 43 basic and applied ARIS projects (Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo, n.d.). Figure 10 illustrates the research diversity of the faculty across different research fields.

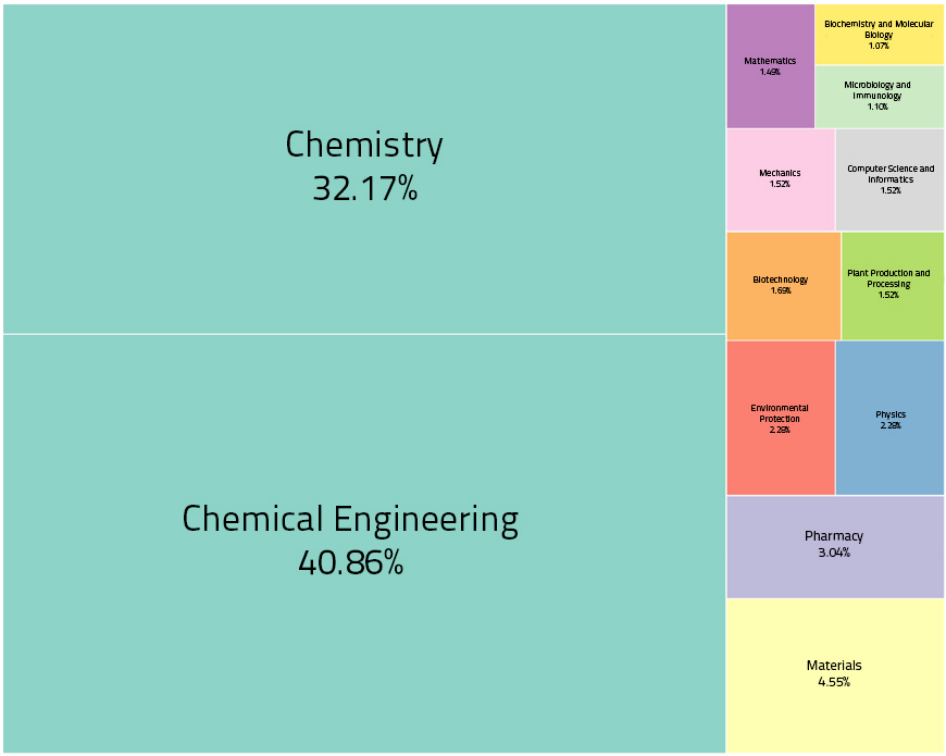

Figure 10: Distribution of research activity at FKKT UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Chemical Engineering, Chemistry, Materials Science and Engineering, and Pharmacy.

The faculty's international research excellence is confirmed by successful acquisition of EU programme projects – FP6, FP7, the SCF Centre of Excellence, and several ongoing H2020 and Horizon Europe projects. Researchers also participate in many other national and international projects. The faculty's impressive scientific output is reflected in the growth of its h-index from 81 to 116 and the doubling of citation counts (from 5,174 to 10,434 according to WoS and from 5,917 to 12,011 according to Scopus) during the period 2015–2024. According to SICRIS indicators normalized per researcher, the faculty ranks at the very top in Slovenia in the fields of chemistry and chemical engineering. Researchers at FKKT UM have received numerous awards and recognitions for research achievements, such as the Selingman APV Fellowship/Bursary in Food Engineering (1997, UK), the American Oil Chemists' Society Prize (AOCS prize) (1997, USA), Innovationspreis Messer Griesheim Preis (1998), the Russian Academy of Sciences and M.V. Lomonosov Moscow State University distinction "In Memory of Academician N.M. Emanuel"

(2018), and honorary membership in the Society of University Professors. The faculty is home to numerous recipients of Zois Awards and recognitions, as well as lifetime achievement awards.

3.5 Faculty of Natural Sciences and Mathematics of the University of Maribor

The scientific research activity of the faculty is organized into internationally recognized research groups in the fields of mathematics, physics, and biology (Univerza v Mariboru, Fakulteta za naravoslovje in matematiko, n.d.). Figure 11 illustrates the research diversity of the faculty across different research fields.

In mathematics, the faculty has achieved notable results with the theory of functional identities (Brešar-Beidar-Čebotar theory), considered one of the most important theories of the last thirty years in ring theory, which originated at the University of Maribor. The excellence of mathematical research is demonstrated by nine Zois Awards and recognitions granted to mathematicians of the University of Maribor between 1990 and 2023. In physics, the greatest breakthrough was achieved by the sociophysics group, which placed the University of Maribor on the global map with more than 400 original scientific articles and 50,000 citations. Physics research also includes biophysics, soft matter physics, and educational physics. For their research in physics, researchers have received numerous national and international awards, including the Zois Award and recognition, Blinc Award, Young Scientist Award for Socio and Econophysics from the German Physical Society, USERN Award, honorary membership in the American Physical Society, membership in the European Academy of Sciences and Arts, and others. The faculty achieves high international visibility in research, as confirmed by the inclusion of a researcher among the top 1% most cited physicists in the world, first in 2024 and then every year since 2018. Biological research is conducted in eight specialized departments, where researchers focus on botany, zoology, animal physiology, ecology, microbial and molecular biosciences, and didactics. An important part of the activity is the Institute for Biology, Ecology, and Nature Conservation. The faculty is characterized by strong international integration, leadership of numerous projects, and participation in international consortia such as the European infrastructure consortium LifeWatch ERIC. Researchers in biology have received multiple awards and recognitions and have participated in organizing several internationally renowned scientific conferences.

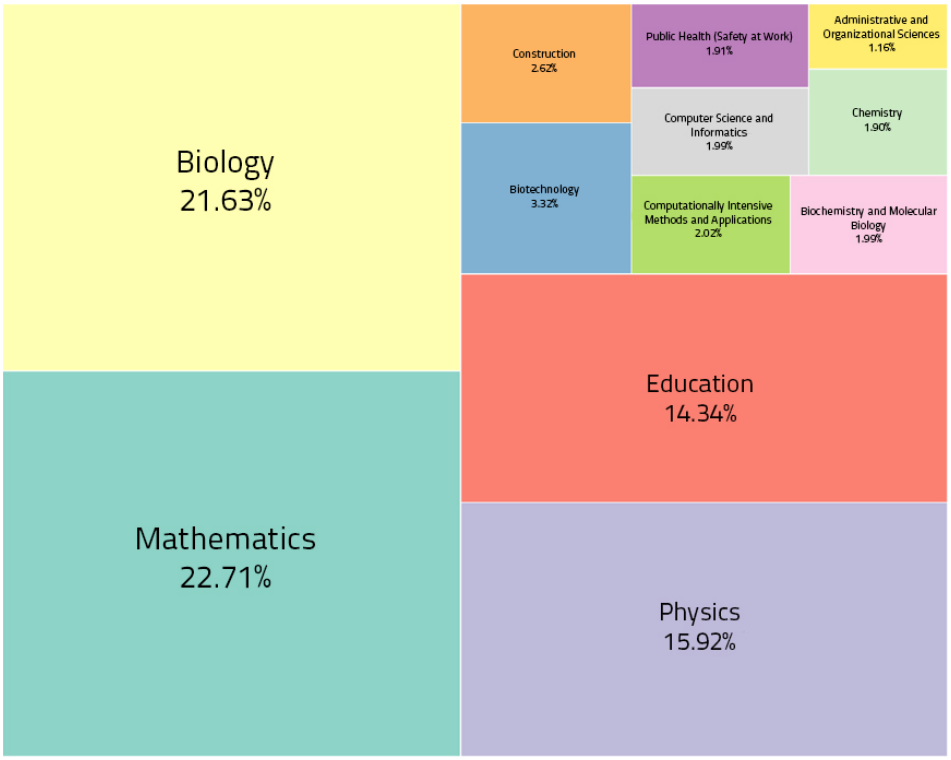

Figure 11: Distribution of research activity at FNM UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Mathematics, Biology, Physics, and Educational Studies.

3.6 Faculty of Logistics of the University of Maribor

The scientific research activity of FL UM takes place in four specialized laboratories: for quantitative modelling in logistics, cognitive systems in logistics, sustainable mobility and transport, and management in logistics and supply chains (Univerza v Mariboru, Fakulteta za logistiko, n.d.). Figure 12 illustrates the research diversity of the faculty across different research fields.

The faculty achieves high international visibility in research, as confirmed by the inclusion of a researcher in the list of the top 2% most influential researchers globally according to Stanford and Elsevier criteria. The research priority of the faculty is the implementation of projects aligned with the Smart Specialization Strategy (S5), with an emphasis on multimodality, smart cities, digitalization of logistics processes, and

the circular economy. In 2024, researchers obtained the first basic research project on the safety of electric micromobility in urban environments and funding to strengthen programme cores. The faculty publishes the scientific journal Logistics, Supply Chain, Sustainability and Global Challenges, which it aims to include in the international Scopus database in the future.

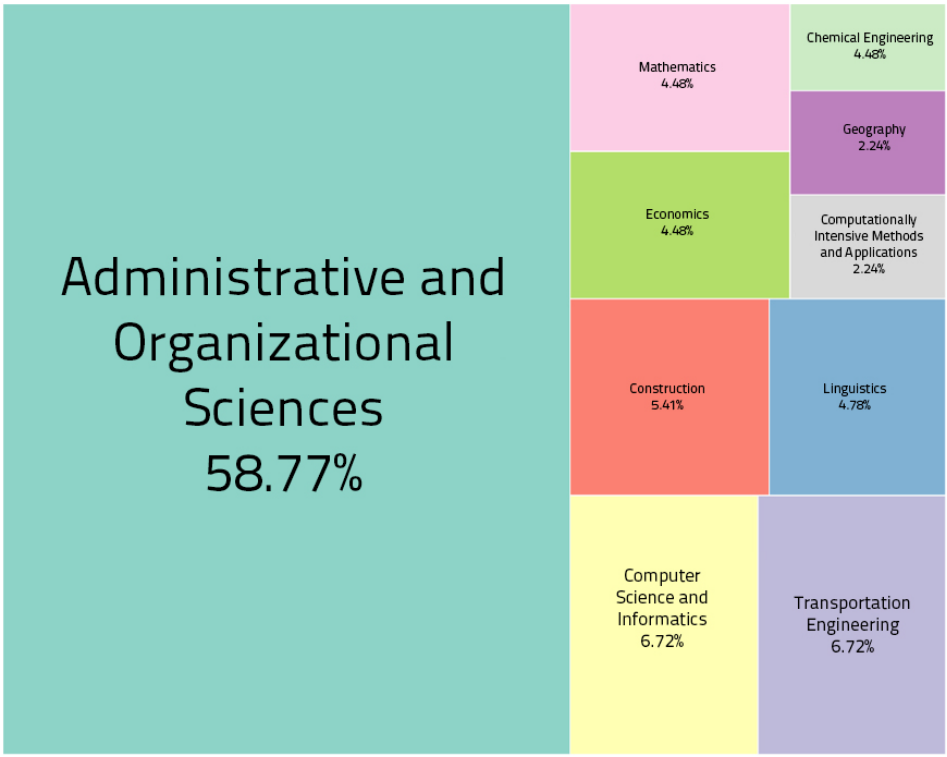

Figure 12: Distribution of research activity at FL UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Administrative and Organisational Sciences, Computer Science and Informatics, and Transportation Engineering.

3.7 Faculty of Energy Technology of the University of Maribor

The scientific research activity of FE UM is focused within the Research Group of the Institute of Energy Technology, which conducts research in ten specialized laboratories: for energy management, alternative energy technologies, thermomechanics, nuclear energy, virtual engineering, energy conversions, dynamic

systems, electric machines, applied electrical engineering, and environmental protection (Univerza v Mariboru, Fakulteta za energetiko, n.d.). Figure 13 illustrates the research diversity of the faculty across different research fields.

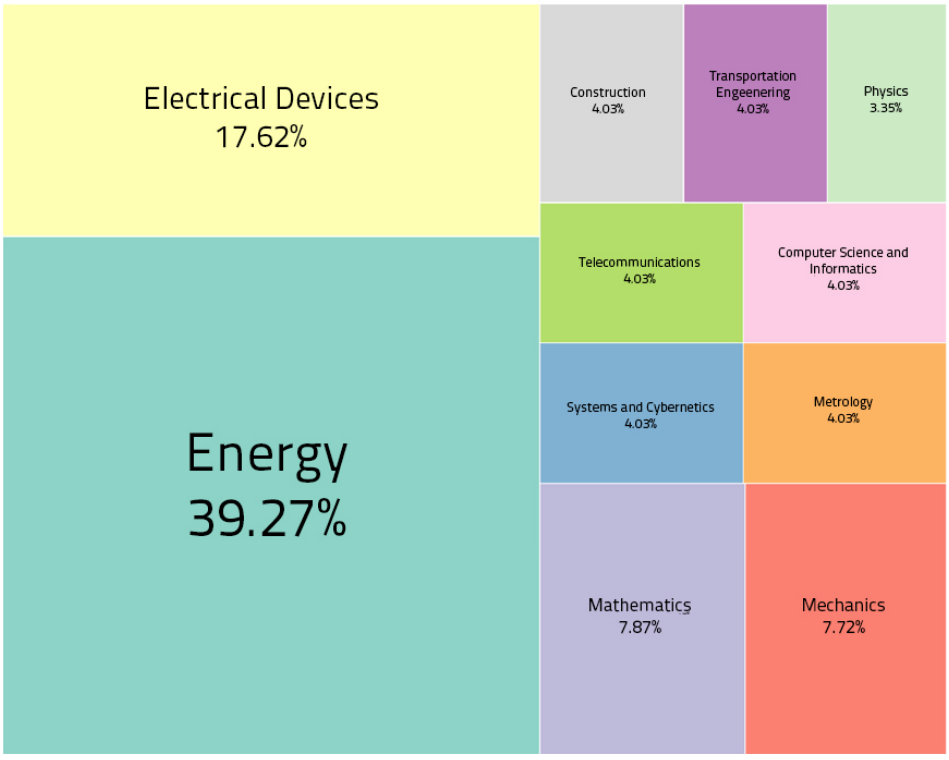

Figure 13: Distribution of research activity at FE UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Energy Engineering, Electrical Devices, Mathematics, and Mechanics.

Between 2021 and 2023, the faculty upgraded its research infrastructure with state-of-the-art equipment through the project Upgrading National Research Infrastructures – RIUM. The high quality of research work is reflected in publications in prestigious international journals, participation in programme groups of the University of Maribor and the Jožef Stefan Institute, and prestigious awards such as the Bedjanič Award for doctoral work in 2024.

3.8 Faculty of Economics and Business of the University of Maribor

In the field of social sciences, the first research institute – the Institute for Marketing – was established in 1969 at the then VEKŠ as a centre for introducing students to research, developing projects for industry, and providing consulting services. Another milestone was the establishment of the Computer Centre in 1977, which strengthened the integration of computing into research.

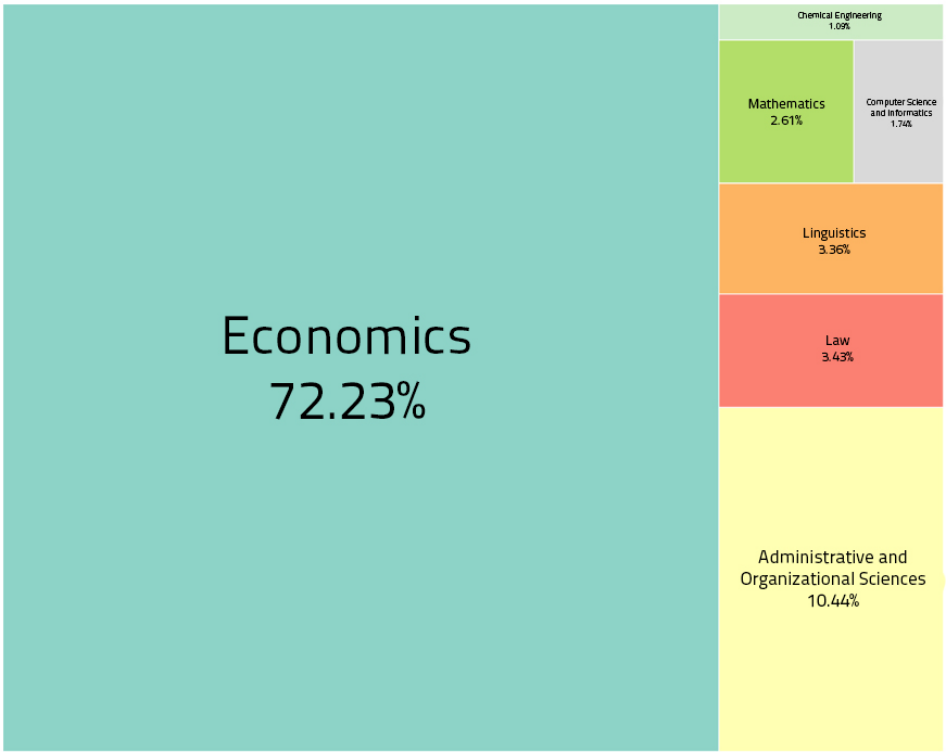

Figure 14: Distribution of research activity at EPF UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Economics, Administrative and Organisational Sciences, and Law.

The transformation into EPF UM in 1989 gave new impetus to research; today, 15 institutes operate with 78 researchers implementing two key research programmes with a strong interdisciplinary approach and international integration (Univerza v Mariboru, Ekonomsko-poslovna fakulteta, n.d.). Figure 14 illustrates the research diversity of the faculty across different research fields.

In 2024, the faculty established an advanced laboratory for quantitative risk management, introducing innovative approaches to big data analysis, focused on promoting sustainable development and social responsibility.

3.9 Faculty of Arts of the University of Maribor

The development of research in the humanities and social sciences is linked to the establishment of the Pedagogical Academy in 1961, which became one of the founding members of the University of Maribor in 1975 and grew into a large Faculty of Education in 1986, and even more so after 2006, when it was divided into three smaller faculties (PEF UM, FNM UM, FF UM) (Univerza v Mariboru, Filozofska fakulteta, n.d.). Figure 15 illustrates the research diversity of the Faculty of Arts across different research fields.

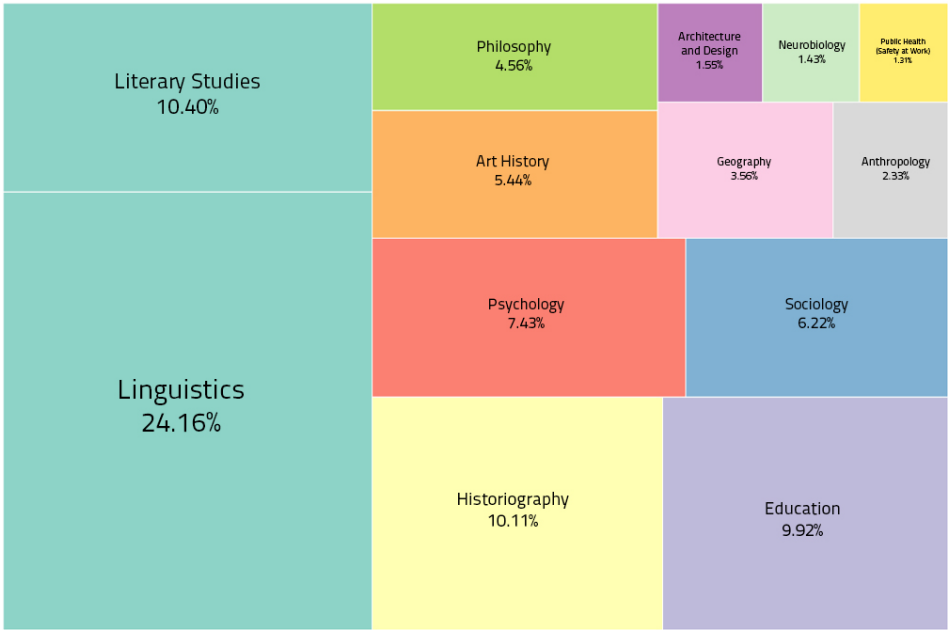

Figure 15: Distribution of research activity at FF UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Linguistics, Literary Studies, Historiography, Educational Studies, Psychology, Sociology, Art History, and Philosophy.

The Faculty Institute for Scientific Research comprises 10 research groups with 136 researchers. Four research programmes are implemented at FF UM. The number of acquired ARIS projects (including two large ones), international projects, and other projects has significantly increased. At the Department of History alone, there have been or are currently 15 ARRS/ARIS scientific research projects, including 4 postdoctoral and 1 so-called large project (bringing together ten partner institutions); a total of 42 members of the Department have participated or are still participating in these projects. Additionally, 24 members of the Department have participated or are currently participating in 13 ARRS/ARIS projects led/coordinated by other institutions. FF develops relevant fundamental research in the humanities and social sciences while increasingly working in an interdisciplinary manner (e.g., projects ZELEN.KOM and in the field of heritage science AID HCH).

3.10 Faculty of Education of the University of Maribor

In 1975, at the Pedagogical Academy, the predecessor of the Faculty of Education, the Centre for Development and Research was established, which was renamed the Research Institute in 1986 and later the Scientific Institute.

Until 2006, research activity was well developed in the fields of social sciences, humanities, natural sciences, and mathematics (Univerza v Mariboru, Pedagoška fakulteta, n.d.). Figure 16 illustrates the research diversity of the faculty across different research fields.

After the division of the Faculty of Education into three faculties, the Faculty of Education began developing research activity in the field of social sciences – educational sciences – and started publishing the Journal of Elementary Education, indexed in Scopus since 2020.

In recent years, in addition to projects and programmes funded by ARIS, the faculty has been implementing RRP projects, and the EDUMLAB research group represents the central research group. A laboratory for kinesiology has also been established.

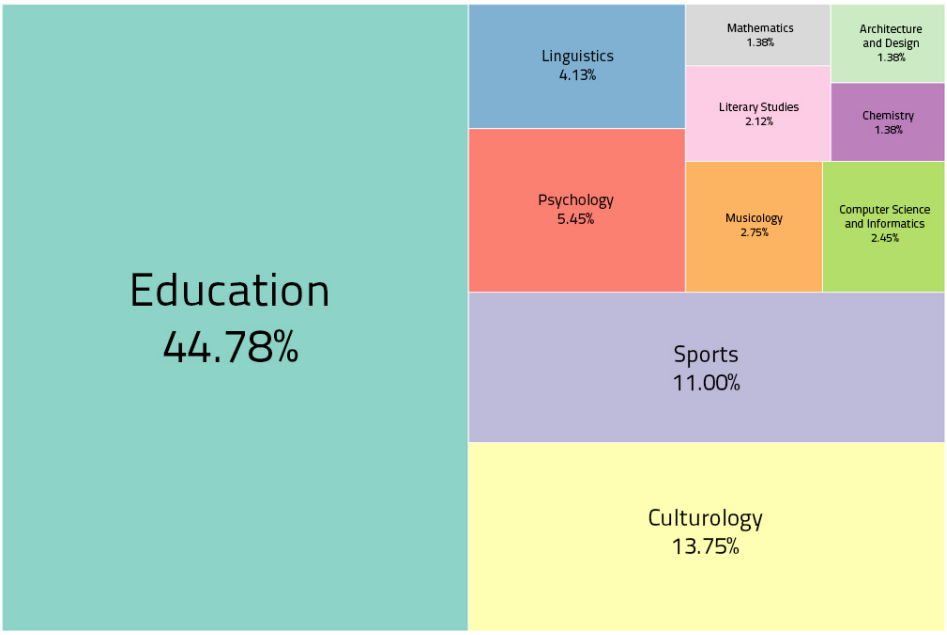

Figure 16: Distribution of research activity at PEF UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Educational Studies, Culturology, and Sports.

3.11 Faculty of Organizational Sciences of the University of Maribor

The research activity of the Faculty of Organizational Sciences, characterized by interdisciplinarity, takes place at the Institute for Organization and Management and the Research Centre, in the form of research and development projects and the faculty's research programmes. At the same time, cooperation with industry and the broader local community is one of the most important segments of research activity – collaboration with partner universities, companies, the public sector, and organizations in the region and beyond reflects the orientation toward a sustainable, socially responsible, and open faculty (Univerza v Mariboru, Fakulteta za organizacijske vede, n.d.). Figure 17 illustrates the research diversity of the faculty across different research fields.

An important component of research work is also the presentation of research results and achievements. Research areas at FOV UM include organization and management, human resources and educational systems, business and work systems engineering, information systems, crisis management, and asset management.

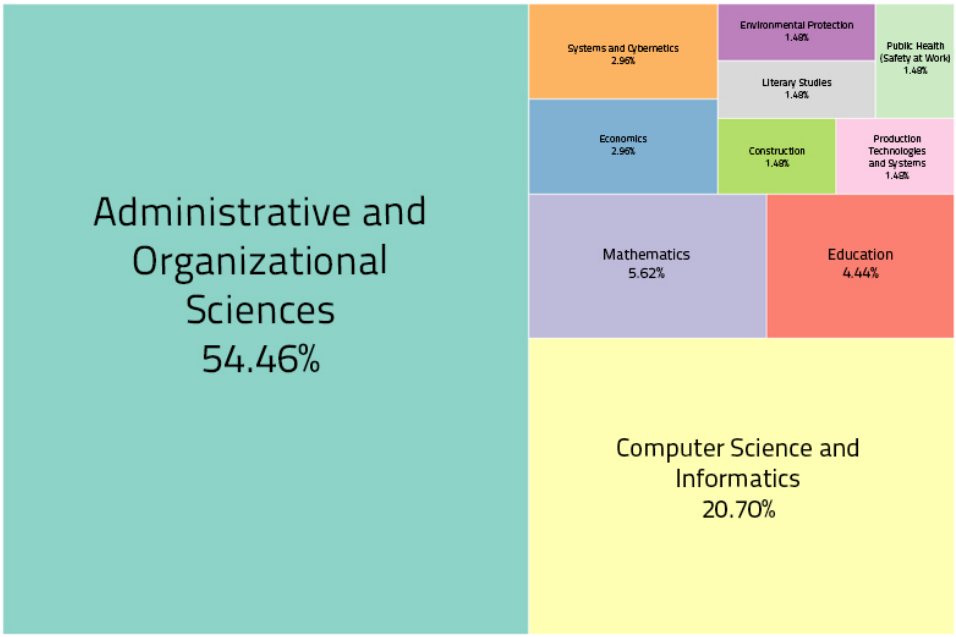

Figure 17: Distribution of research activity at FOV UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Administrative and Organisational Sciences, Computer science and Informatics, Mathematics, and Educational Studies.

3.12 Faculty of Law of the University of Maribor

The Faculty of Law ranks among the leading research institutions in the field of law in Slovenia. Its research work is strongly integrated into the international environment. The faculty conducts basic and applied research in various areas of law (Univerza v Mariboru, Pravna fakulteta, n.d.). Figure 18 illustrates the research diversity of the faculty across different research fields.

Most employees are involved in the PF UM programme group, while research is funded from public and private sources, recently through the ARIS project Everyone is in Services (2024), the Jean Monnet project on fundamental rights in business law (2021), and the EU-En4s project on cross-border debt recovery (EU Justice, 2019). Students are actively involved in research activities. Through publishing, the faculty significantly contributes to the development of legal science, striving to protect the rule of law both in Slovenia and the EU.

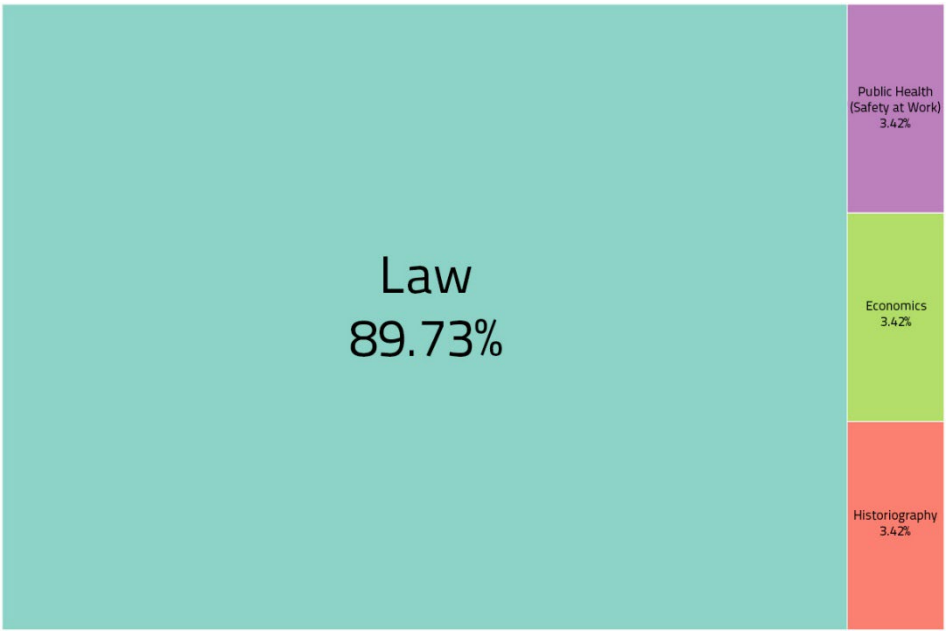

Figure 18: Distribution of research activity at PF UM by research fields (the size of each field reflects the share of research activities in that area). The main research field is Law.

3.13 Faculty of Criminal Justice and Security of the University of Maribor

After 2004, with its integration into the University of Maribor and the establishment of the Institute of Security Studies, research became a more intensive and internationally oriented activity. Today, the Institute carries out basic, applied, development, and other projects within national and international research programmes (Univerza v Mariboru, Fakulteta za varnostne vede, n.d.; Meško, 2023). Figure 19 illustrates the research diversity of the faculty across different research fields.

The faculty's research activity covers a wide range of areas, such as criminology, law, security management, information security, psychology, sociology, criminalistics, and policing. Since 2015, a large part of research activities has taken place within the programme group Security in Local Communities (Meško & Hacin, 2024). Research has focused on addressing societal challenges such as crime, ensuring security and human rights, as well as cybersecurity.

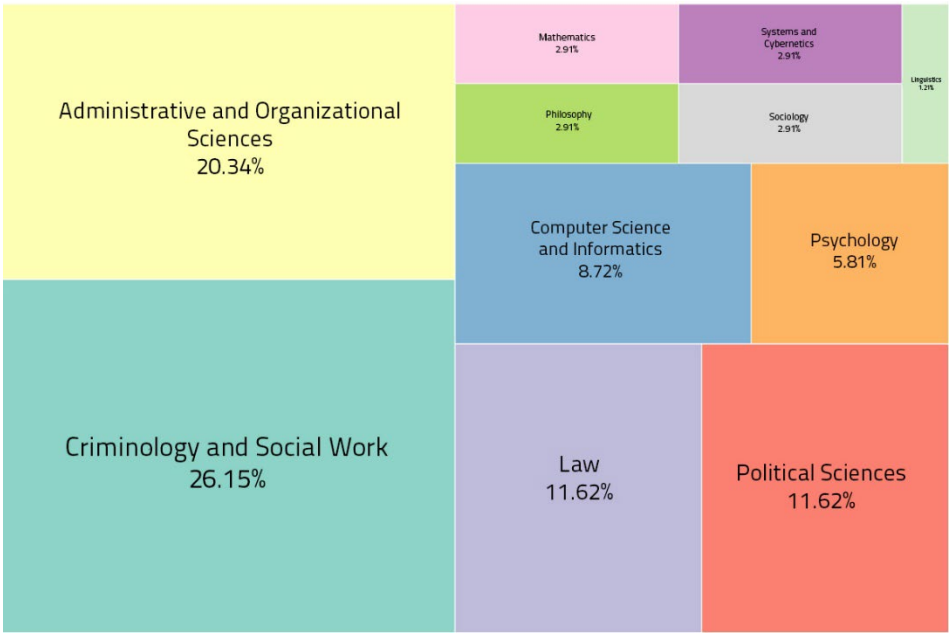

Figure 19: Distribution of research activity at FVV UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Criminology and Social Work, Administrative and Organisational Sciences, Law, Political Sciences, and Computer Science and Informatics.

3.14 Faculty of Tourism of the University of Maribor

At the heart of research at one of the youngest members is tourism, which established its first research institute – the Institute for Tourism – in 2015. An interdisciplinary perspective on tourism is central to more than 90 research and development projects that successfully involve students, international partners, and industry (Univerza v Mariboru, Fakulteta za turizem, n.d.). Figure 20 illustrates the research diversity of the faculty across different research fields.

Since 2020, the results of targeted and basic research projects have attracted the interest of the broader professional, academic, and general public, positioning the faculty among prominent research institutions in Slovenia and worldwide.

Critical thinking and social responsibility are at the core of research at the Faculty of Tourism. Contemporary challenges related to the role of tourism in environmental and social changes are topics that researchers approach with a critical and interdisciplinary stance.

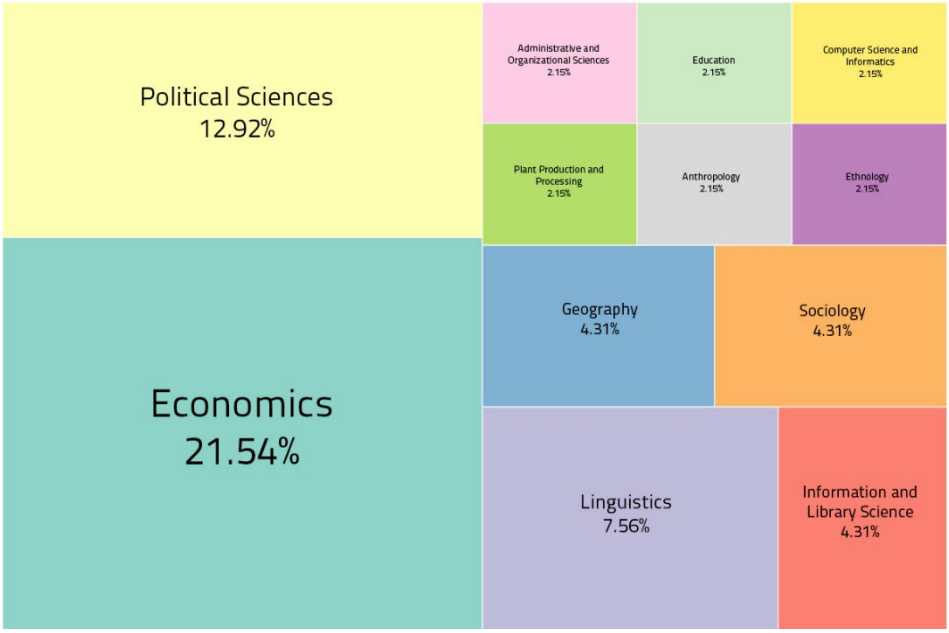

Figure 20: Distribution of research activity at FT UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Economics, Political Sciences, and Linguistics.

3.15 Faculty of Medicine of the University of Maribor

The scientific research activity of the Faculty of Medicine officially began with its registration in the research organizations database in 2005. Research work developed rapidly with the accreditation of the postgraduate programme Biomedical Technology and the recruitment of top researchers. The faculty currently operates 10 research groups with 93 researchers and 15 professional associates. In its twenty years of existence, MF UM has participated in 68 European projects (as the leading organization in 39) and 67 ARIS projects (as the leading organization in 29) (Univerza v Mariboru, Medicinska fakulteta, n.d.). Figure 21 illustrates the research diversity of the faculty across different research fields.

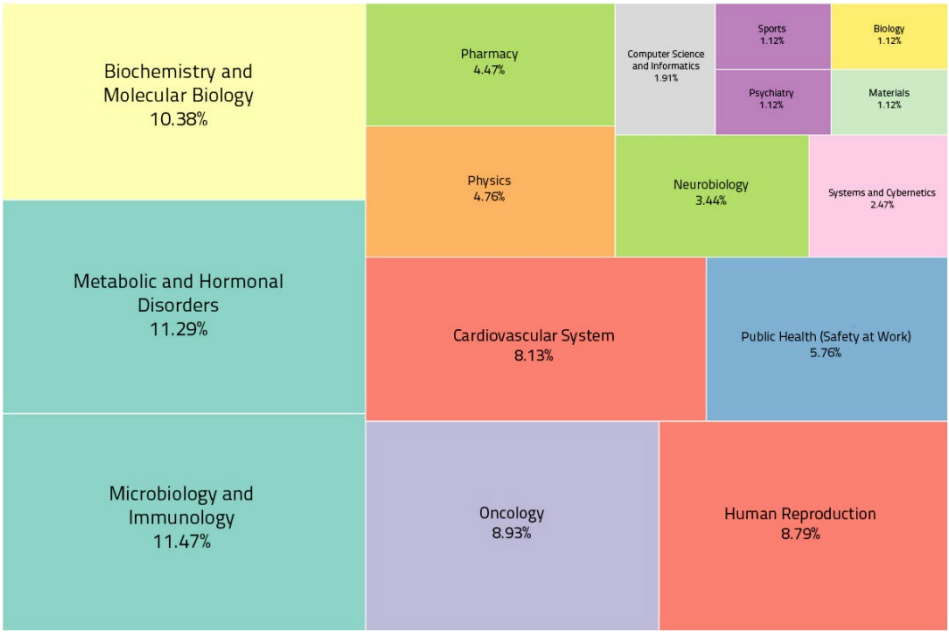

Figure 21: Distribution of research activity at MF UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Microbiology and Immunology, Metabolic and Hormonal Disorders, Biochemistry and Molecular Biology, Oncology, Human Reproduction, and Cardiovascular System.

A significant milestone was the establishment of the scientific journal Acta medico-biotechnica in 2007, the first medical journal published by a medical faculty in Slovenia, which has twice received the Prometheus of Science Award for excellence in communication. The faculty systematically promotes student research through calls for research assignments for the Dean's Awards, granted since 2007; by 2025, 55 Dean's Awards and 10 Perlach Awards have been presented.

3.16 Faculty of Agriculture and Life Sciences of the University of Maribor

The scientific research activity of the faculty has its roots in the establishment of the Junior College of Agronomy in the 1960s. A key development milestone was the relocation to Hompoš Castle in Hoče in 2008, where laboratories were set up and conditions for research work significantly improved (Univerza v Mariboru, Fakulteta za kmetijstvo in biosistemske vede, n.d.). Figure 22 illustrates the research diversity of the faculty across different research fields.

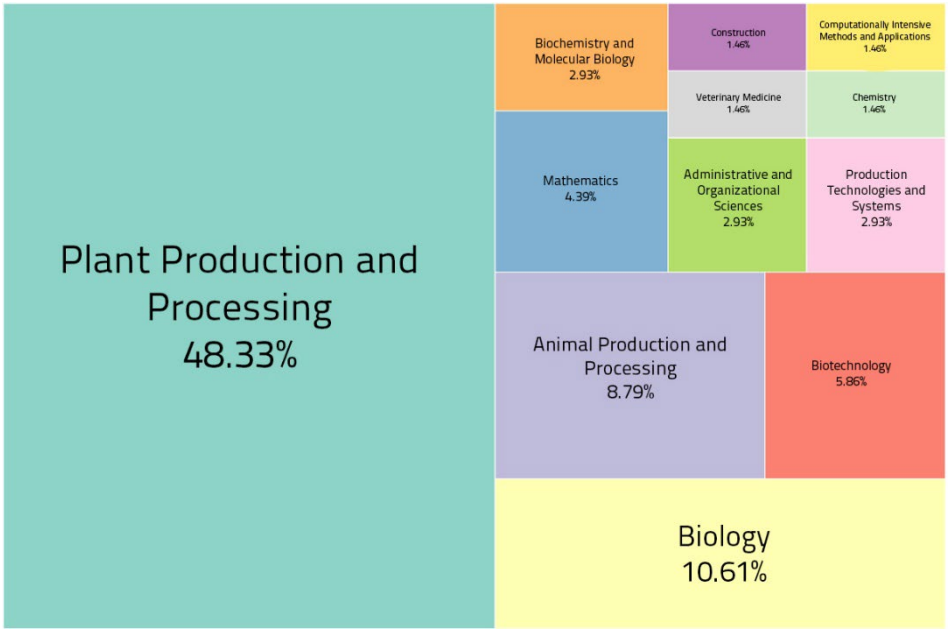

Figure 22: Distribution of research activity at FKBV UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Plant Production and Processing, Biology, Animal Production, and Biotechnology.

The research infrastructure includes laboratories, the University of Maribor Botanical Garden, and the estate of the University Agricultural Centre, which enables outdoor experiments. Since 2003, 54 doctoral students have earned their PhDs at the faculty, including 28 young researchers. In the last three years, funding for project activities has more than doubled. In 2024, the faculty carried out 20 ARIS projects, 14 other national projects, and 5 international projects, including 4 from the Horizon programme. Since 2002, the faculty has published the scientific journal Agricultura (renamed Agricultura Scientia in 2023), in which 139 scientific articles have been published.

3.17 Faculty of Health Sciences of the University of Maribor

The scientific research activity of the faculty began with the establishment of the first Institute for Nursing in Slovenia in 1996, dedicated to interdisciplinary research. Today, the faculty operates four institutes and three research groups with 41 researchers (Univerza v Mariboru, Fakulteta za zdravstvene vede, n.d.). Figure 23 illustrates the research diversity of the faculty across different research fields.

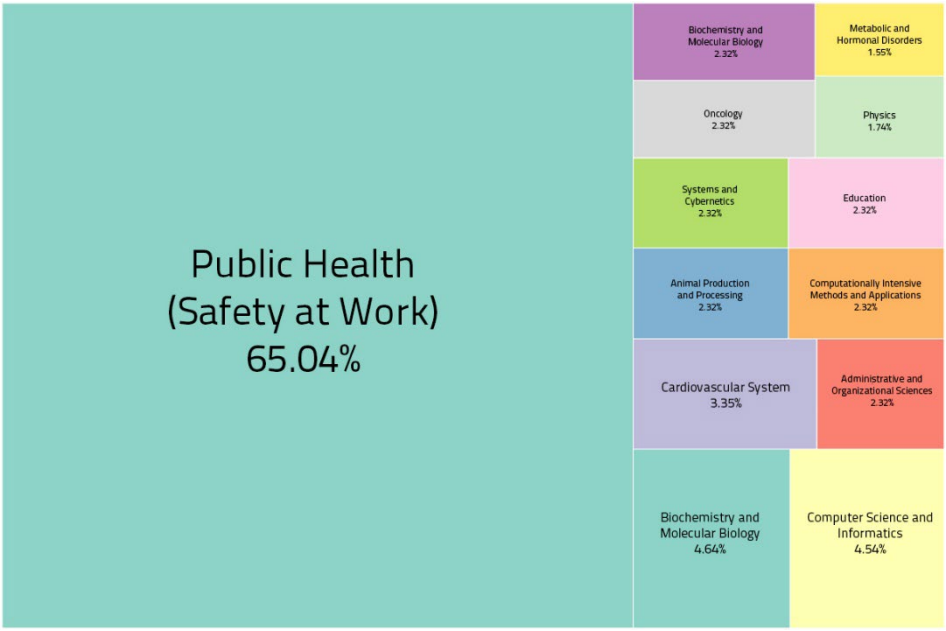

Figure 23: Distribution of research activity at FZV UM by research fields (the size of each field reflects the share of research activities in that area). The main research fields are Public Health (Safety at Work), Microbiology and Immunology, and Computer Science and Informatics.

A key development milestone was the establishment of the first doctoral programme in Nursing in Slovenia (2016), which enabled a full education vertical and contributed to the development of research. Since 2005, the faculty has participated in 13 international and 10 ARIS projects, acting as the leading organization in 13 cases. In the past ten years, more than 200 students have been involved in 31 student projects. The faculty provides a stimulating research environment, including the Centre for Simulated Clinical Settings, the Centre for the Use of Augmented Reality in Healthcare, and a laboratory for microbiology and molecular biology. International recognition is confirmed by awards received by researchers (UNEP, Fulbright, DAAD, DARPA) and active participation in the UDINE-C group.

4 Artistic Activity

Artistic activity at the University of Maribor plays an important role in the comprehensive development of the academic environment, even though the university does not yet have its own Academy of Arts. The university recognizes art

as a parallel and autonomous reality that broadens and enriches our perception of the world and represents an essential civilizational value.

In the field of music, the University of Maribor has achieved remarkable success and international recognition. Prominent positions are held by recipients of the Prešeren Award, such as Tomaž Svete and Nina Šenk, who were also awarded at the international opera competition Johann-Joseph-Fux – the former in 2000 for the philosophical opera Kriton, the latter in 2021 for the opera Canvas. The university's reputation has also been significantly enhanced by outstanding musical creators and educators: composer Darijan Božič, choir conductors Branko Rajšter and Jože Fürst, composer Jože Gregorc, conductors Stane Jurgec and Simon Robinson, and opera singers Ondina Otta Klasinc and Dragica Kovačič.

In the field of visual arts, UM cultivates a rich tradition, with Prešeren Award recipient Oto Rimele (2004) among its distinguished artists. At the Faculty of Education, where the study programmes in Art Education and Music Education are offered, renowned artists and educators are active. The Department of Fine Arts, dating back to 1961, has strengthened its role in the development of visual arts in the region through the work of artists such as Anka Krašna, Breda Varl, Vlasta Tihec, Bogdan Čobal, and Dragica Čadež (Prešeren Award recipient). Today's academic staff includes established artists: Alja Košar, Petra Varl, Tanja Verlak, Darko Golija, Samuel Grajfoner, Matej Koren, Robert Lozar, Dušan Zidar, and Oto Rimele. Despite the fact that the proposal for the establishment of the Academy of Arts at UM was prepared in the mid-2000s and the academy was formally established in 2011, challenges remain in securing premises and funding for its actual operation. The academy would enable study programmes in the fields of visual arts, music, and performing arts, filling a gap in northeastern Slovenia. Its establishment was also envisaged in the programme of the European Capital of Culture Maribor 2012 but was not realized.

The University of Maribor recognizes science and art as fundamental aspects of its civilizational mission, enabling the holistic development of individuals and contributing to the common good. Artistic activity at the university is not only part of the educational process but also makes an important contribution to European and global cultural heritage.

5 Conclusion and Vision for the Future

The scientific and artistic journey of the University of Maribor is marked by a persistent rise in excellence and international recognition. The university has become an important centre of knowledge and creativity in the wider region, with its researchers and artists contributing to the development of science and art at both national and international levels. Strategic programme cores – Artificial Intelligence and Data Science in Biomedicine, Materials and Technologies, and Heritage Science and Climate Change – have become the central pillars around which research activities of various faculties and departments are interconnected.

The development vision is based on further strengthening of the interdisciplinary approach, greater integration with industry, cultural institutions, and society at large, as well as intensive international cooperation. Special attention is devoted to research and artistic creation addressing global challenges – from climate change and sustainable development to social transformations and cultural identities. In the future, programme cores will increasingly act as integrative mechanisms that foster collaboration and enable the crossing of traditional disciplinary boundaries, thereby enhancing the university's research potential and its impact on solving complex societal challenges. The long-term strategy for developing research infrastructure foresees substantial investments in selected strategic capacities (AI Factory, HB SAXS synchrotron beamline), which will support all three programme cores and strengthen international partnerships.

The University of Maribor will maintain, consolidate, and develop a sustainable, connected, empowered, and efficient network of professional support for research, artistic, and project activities, reinforcing professional staff and supporting their expertise and career development both at the rectorate and faculty level. In a broader sense, this will also contribute to greater visibility, recognition, and acknowledgement of the demanding profession of Research Manager and Administrator in the national and European context.

Through its scientific and artistic work, the University of Maribor consolidates its position as a creator of knowledge and culture, building bridges between disciplines, academia, industry, and art, and acting as an equal partner in the international arena.

Data availability: The data and code used in this chapter are openly available at https://github.com/deankorosak/sciart.

Sources and References

ATHENA European University. (n.d.). *ATHENA European University*. https://athenauni.eu/

CoARA, Coalition for Advancing Research Assessment. (n.d.). *What is CoARA?*. https://coara.eu/

EOSC, European Open Science Cloud Association. (n.d.). *EOSC Association Advancing Open Science in Europe*. https://eosc.eu/

EARMA, European Association of Research Managers and Administrators. (n.d.). *European Association of Research Managers and Administrators (EARMA): Homepage*. https.://earma.org

EUA, European University Association. (n.d.). *The voice of Europe's Universities* https://www.eua.eu/

Meško, G. (Ed.). (2023). *Znanstveno raziskovanje in pedagoška dejavnost Fakultete za varnostne vede Univerze v Mariboru: (1973–2023)*. Univerza v Mariboru, Univerzitetna založba.

Meško, G., & Hacin, R. (Eds.). (2024). *10. Nacionalna konferenca o varnosti v lokalnih skupnostih: Mirna, varna in inkluzivna družba ter varnost v lokalnih skupnostih*. Univerza v Mariboru, Univerzitetna založba. https://doi.org/10.18690/um.fvv.10.2024

Tancer Verboten, M., & Korošak, D. (2025). *Resilience and volatility in academic publishing, the case of the University of Maribor 2004–2023*. arXiv. https://arxiv.org/abs/2503.21423v1

Univerza v Mariboru. (n.d.-a). *Odprta znanost*. https://www.um.si/raziskovanje/odprta-znanost/

Univerza v Mariboru. (n.d.-b). *Politika odprtega dostopa do raziskovalne infrastrukture*. https://www.um.si/raziskovanje/raziskovalna-infrastruktura/politika-odprtega-dostopa-do-raziskovalne-infrastrukture/

Univerza v Mariboru. (n.d.-c). *Poslanstvo, vizija in strateški razvojni dokumenti*. https://www.um.si/o-univerzi/predstavitev/poslanstvo-vizija-in-strateski-razvojni-dokumenti/

Univerza v Mariboru. (n.d.-d). *Raziskovalna infrastruktura Univerze v Mariboru*. https://www.um.si/raziskovanje/raziskovalna-infrastruktura/

Univerza v Mariboru, Ekonomsko-poslovna fakulteta. (n.d.). *Univerza v Mariboru, Ekonomsko-poslovna fakulteta*. https://www.epf.um.si/

Univerza v Mariboru, Fakulteta za elektrotehniko, računalništvo in informatiko. (n.d.). *Univerza v Mariboru, FERI, Fakulteta za elektrotehniko, računalništvo in informatiko*. https://feri.um.si/

Univerza v Mariboru, Fakulteta za energetiko. (n.d.). *Univerza v Mariboru, Fakulteta za energetiko: FE UM*. https://www.fe.um.si/

Univerza v Mariboru, Fakulteta za gradbeništvo, prometno inženirstvo in arhitekturo. (n.d.). *Univerza v Mariboru, Fakulteta za gradbeništvo, prometno inženirstvo in arhitekturo*. https://www.fgpa.um.si/

Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo. (n.d.). *Univerza v Mariboru, Fakulteta za kemijo in kemijsko tehnologijo*. https://www.fkkt.um.si/

Univerza v Mariboru, Fakulteta za kmetijstvo in biosistemske vede. (n.d.). *Znanje in tradicija*. https://www.fkbv.um.si/

Univerza v Mariboru, Fakulteta za logistiko. (n.d.). *Univerza v Mariboru, Fakulteta za logistiko*. https://fl.um.si/

Univerza v Mariboru, Fakulteta za naravoslovje in matematiko. (n.d.). *Univerza v Mariboru, Fakulteta za naravoslovje in matematiko*. https://www.fnm.um.si/

Univerza v Mariboru, Fakulteta za organizacijske vede. (n.d.). *Univerza v Mariboru, Fakulteta za organizacijske vede*. https://www.fov.um.si/

Univerza v Mariboru, Fakulteta za strojništvo. (n.d.). *FS, Fakulteta za strojništvo*. https://www.fs.um.si/

Univerza v Mariboru, Fakulteta za turizem. (n.d.). *Fakulteta za turizem*. https://www.ft.um.si/

Univerza v Mariboru, Fakulteta za varnostne vede. (n.d.). *Inštitut za varstvoslovje*. https://www.fvv.um.si/vstopna-stran/raziskovalna-dejavnost/institut-za-varstvoslovje/

Univerza v Mariboru, Fakulteta za zdravstvene vede. (n.d.). *Univerza v Mariboru, Fakulteta za zdravstvene vede*. https://www.fzv.um.si/

Univerza v Mariboru, Filozofska fakulteta. (n.d.). *Univerza v Mariboru, Filozofska fakulteta*. https://ff.um.si/

Univerza v Mariboru, Medicinska fakulteta. (n.d.). *Univerza v Mariboru, Medicinska fakulteta.* https://www.mf.um.si/si/

Univerza v Mariboru, Pedagoška fakulteta. (n.d.). *Univerza v Mariboru, Pedagoška fakulteta.* https://pef.um.si/

Univerza v Mariboru, Pravna fakulteta. (n.d.). *Pravna fakulteta Univerze v Mariboru.* https://www.pf.um.si/

Zakon o znanstvenoraziskovalni in inovacijski dejavnosti (ZZrID) [Scientific Research and Innovation Activities Act (ZZrID)]. (2021, 2023, 2024). *Uradni list RS,* (186/21, 40/23, 102/24).

Zakon za uravnoteženje javnih financ (ZUJF) [Fiscal Balance Act (ZUJF)]. (2012). *Uradni list RS*, (40/12).