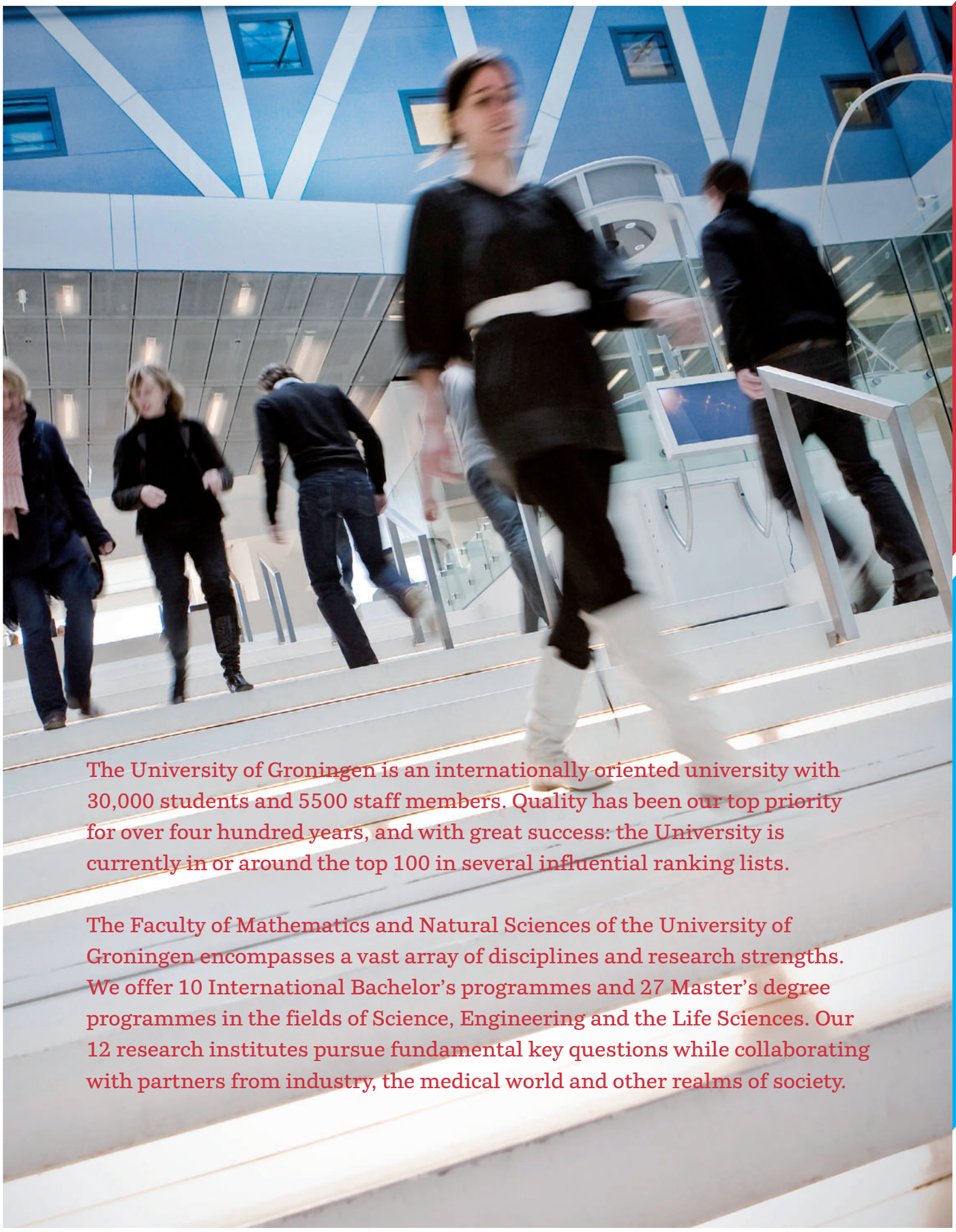
university of groningen

faculty of mathematics and natural sciences

Faculty of Mathematics and Natural Sciences University of Groningen



The University of Groningen is an internationally oriented university with 30,000 students and 5500 staff members. Quality has been our top priority for over four hundred years, and with great success: the University is currently in or around the top 100 in several influential ranking lists.

The Faculty of Mathematics and Natural Sciences of the University of Groningen encompasses a vast array of disciplines and research strengths. We offer 10 International Bachelor's programmes and 27 Master's degree programmes in the fields of Science, Engineering and the Life Sciences. Our 12 research institutes pursue fundamental key questions while collaborating with partners from industry, the medical world and other realms of society.

Bachelor's Degree Programmes

Our Bachelor's degree programmes cover an extensive range of Science and Engineering degrees. We currently offer 10 International Bachelor's programmes, which are all fully taught in English. A unique offer in continental Europe, which demonstrates the pioneering work of the University of Groningen.

Ranking

Our Bachelor Degree Programmes can count themselves among the best in Europe. Our award winning programmes include Biology, Chemistry and Physics, which have all been awarded the CHE excellence ranking, for their exceptionally strong research character and international orientation. Additionally, Applied Physics, Astronomy, Chemical Engineering and Mathematics have all been labeled 'Top Degree Programme', and are recognised as some of the best programmes in their field.

Master's Degree Programmes

We offer a vast array of Master's degree programmes in the fields of Science, Engineering and the Life Sciences. Our Master's degree programmes range from Artificial Intelligence to Evolutionary Biology, and from Nanoscience to Medical and Pharmaceutical Sciences. Many have been awarded a 'Top Programme' label or have been voted best programme in their field, whilst our Nanoscience programme has even been acclaimed best Master's degree in the Netherlands.

Link with research

The teaching at our Master's degree programmes is strongly intertwined with our research. The new developments within the research fields we cover are promptly included in education, this stimulate students to get acquainted with research. In addition, our Master's students are directly involved in our research and receive high-quality supervision during their Master's thesis projects and internships.

Career oriented

Our Master's students are being thoroughly prepared for a career in both research and industry. We offer students the chance to gain industry experience, by offering internships at our partners in a number of engineering programmes. Our choice of industry partners ranges from large multinationals (such as Shell, Philips, Unilever) to dynamic small and medium enterprises in the Groningen area. Moreover, students can combine their degree programme with our Business and Policy track, which prepares them for a top-positions in business counselling.

Research institutes

ALICE
Artificial Intelligence and Cognitive Engineering

The research in artificial intelligence and cognitive engineering is inherently interdisciplinary in nature. With computing science an interest in formal modelling is shared, where these models may be symbolic, statistical or hybrid in nature. With psychology and biology an interest in natural cognition is shared, where the goal is to describe fundamental qualities of cognition in such an explicit way that computational models of perceptual, cognitive, and behavioural control functions can be constructed. The research activities cover four interrelated areas in artificial intelligence: cognitive modelling, multi-agent systems, autonomous perceptive systems, and sensory cognition.

ENTEG
ENgineering and TEchnology institute Groningen

ENTEG is an engineering science and technology institute, whose mission is to analyse, explore and design new technologies based on the integration of fundamental and engineering sciences. Research at the institute focuses on a number of sectors such as the processing, high tech, discrete production and interface industries. Research activities span over a range of diverse topics, including modeling and control of complex (industrial) processes and systems, advanced production engineering (with emphasis on mechanical and materials engineering), chemical reaction engineering for the conversion of biomass into biofuels and bio-based chemicals; product technology (including starch modification, enhanced oil recovery and sustainable chemicals); products and processes for biotechnology, and biocatalysis of carbohydrates and enzymatic pretreatment of aquatic biomass.

ESRIG
Energy and Sustainability Research Institute Groningen

Research at ESRIG is organised along two main themes: *Energy Supply and Energy Conversion and Transition towards Sustainability*. Research areas within the theme Energy Supply and Energy Conversion are energy transition, bio-fuels, organic solar cells, natural gas and new gas mixture combustion research, innovative production methods for fossil fuels, underground coal gasification, geothermal energy, gas transition, hydrogen as energy carrier and (de-central) electricity production control design. The theme Transition towards Sustainability includes the following activities: carbon cycle and greenhouse gases research, CO_2 emission monitoring, surveillance and storage, combustion efficiency and harmful emission reduction, development and evaluation of (inter)national climate policies, and study of the societal and ethical context of scientific/technical transitions towards sustainability. In addition to these core themes, ESRIG research focuses on the Global Change theme, describing the process of climate change and its causes (earth sciences, including climate and paleo-climate), and its (ecological) effects.

GELIFES
Groningen Institute for Evolutionary Life Sciences

The institute aims at bridging the gap between the mechanistic, ecological and evolutionary studies of biological processes, with a special focus on the adaptive potential of life. The institute coordinates the local Research School Ecology and Evolution (RSEE) and participates in the interfaculty Research School of Behavioural and Cognitive Neurosciences (BCN). GELIFES conducts research in animal ecology, behavioural biology, behavioural physiology, behavioural ecology and self-organization, chronobiology, community and conservation ecology, evolutionary genetics, marine benthic ecology and evolution, marine evolution and conservation, microbial ecology, molecular neurobiology, neuroendocrinology, plant ecophysiology, theoretical biology.

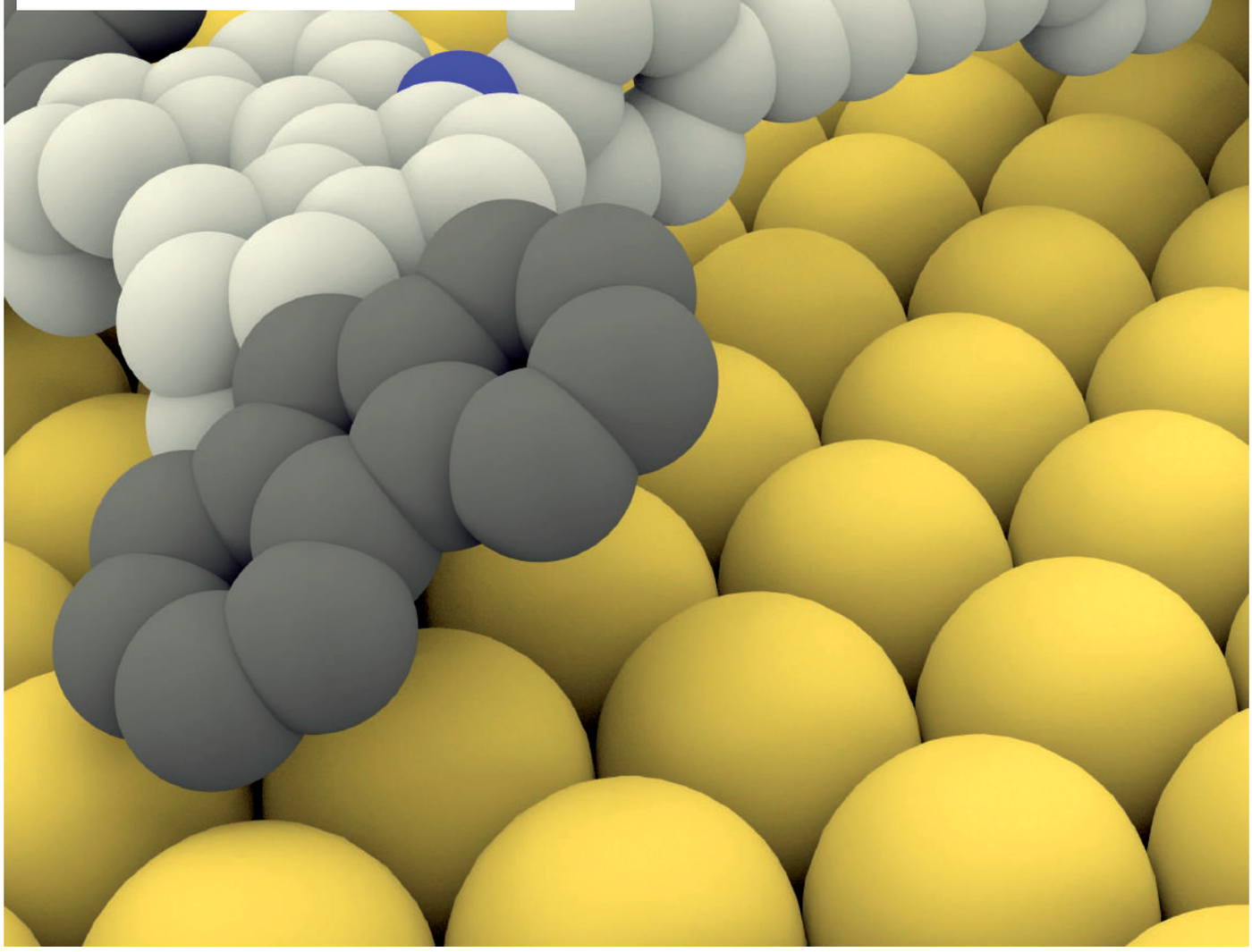
Research institutes

GBB
Groningen Biomolecular Sciences and Biotechnology Institute

The Groningen Biomolecular Sciences and Biotechnology institute has the ambition to perform research of the highest standard in the field of biomolecular sciences, studying microbial processes and cells. GBB has achieved a strong reputation in protein structure determination and analysis, biochemistry, molecular genetics, and molecular cell- and microbiology. The institute has also witnessed a remarkable growth in microbiological sciences, stimulated by strong teams incorporating modern approaches in genomics, single cell- and single molecule analyses, high-resolution microscopy, and advanced cell engineering. In view of the emerging societal and industrial need to develop sustainable biobased processes, and the undisputed and important role that microbial processes play in this field, GBB strives to further concentrate its research profile in two focal areas: Molecular Mechanisms of Bioprocesses and Physiology and Systems Biology.

GRIP
Groningen Research Institute of Pharmacy

The Groningen Research Institute for Pharmacy conducts both fundamental and applied research. The institute is embedded in the Faculty of Mathematics and Natural Sciences and located in proximity of the University Medical Center Groningen (UMCG), which creates the ideal conditions for interfaculty collaborations producing top-notch research at international level. Research areas include pharmaco-therapy and pharmaceutical care, analytical biochemistry, drug design, pharmaceutical biology, pharmaceutical technology and biopharmacy, molecular pharmacology, pharmacokinetics, toxicology and targeting, pharmaceutical analysis, pharmacoepidemiology and pharmacoeconomics, and pharmaceutical gene modulation.



JBI
Johann Bernoulli Institute for Mathematics and Computer Science

The Johann Bernoulli Institute for Mathematics and Computer Science aims at conducting research that addresses fundamental questions within the disciplines Mathematics and Computer Science, but also has a strong orientation towards applications in science, industry, and society. The institute plays a major role in the recently established Centre for Data Science and Systems Complexity (DSSC) of the Faculty. The ambition is to understand and solve 'big data' problems by exploiting the joint perspectives from both data science and complexity science. The research program of JBI covers six areas: fundamental mathematics, applied mathematics, probability and statistics, fundamental computing, visual computing and pattern recognition, and computer engineering.

Kapteyn Astronomical Institute

Research at the Kapteyn Institute is concentrated on the following areas: observational cosmology and galaxy surveys, high-energy astrophysics: neutron stars and black holes, star and planet formation and the Interstellar medium of galaxies, active galactic nuclei and quasars formation, evolution and structure of galaxies, cosmology and the large scale structure of the universe, virtual observatory and astronomical datacentres. In addition to this, researchers of the Kapteyn Astronomical Institute are actively involved in the construction of instruments for large ground-based telescopes and satellites, in collaboration with the Laboratory for Space Research (SRON), the Netherlands Institute for Radio Astronomy (ASTRON), or with other partners. A number of these projects are carried out in collaboration with other Dutch astronomical institutes, as part of the School of Excellence NOVA.

Stratingh Institute for Chemistry

The mission of the Stratingh Institute for Chemistry is to perform excellent research in molecular and supramolecular chemistry. Focus areas within the institute are the following: 1) synthesis/catalysis – molecular assembly, recognition, transport, motion and catalysis inspired by nature. The goal is to exploit the full potential of synthetic chemistry to create new structures and functions; 2) biochemistry – the research is carried out in close collaboration with groups in immunology, microbiology and membrane biochemistry. Aim is to contribute to the diagnosis of, and vaccine development against, mycobacterial diseases; 3) analytical/physical chemistry - functional molecular based materials that encompass key expertise in electrochemistry and spectroscopy; 4) design and synthesis of 'smart' molecules that can perform special functions in a device. In short: organic synthesis for and through nanotechnology.

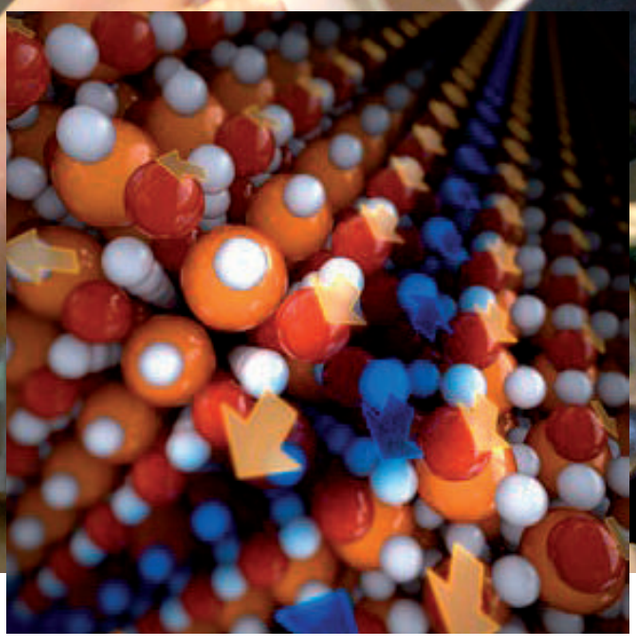
Research institutes

Van Swinderen Institute for particle physics and gravity

The aim of the Van Swinderen Institute for Particle Physics and Gravity is to study the fundamental forces of nature with implications for our Universe. These investigations connect through close similarities in physics from Planck-scale physics (quantum gravity) via sub-atomic scales (particle physics) to cosmic dimensions. There are both theoretical as well as experimental efforts in more specialized topics such as the test of fundamental symmetries and forces, LHC and Beyond the Standard Model physics, holography, string theory and inflation. The experiments range from precision experiments at low energies conducted locally to the ones at the highest accessible energies such as at the LHC. Quantum Gravity & Cosmology, Theoretical Particle Physics, Cold Molecules, Ions, LHCb.

ZIAM
Zernike Institute for Advanced Materials

The research programme of the Zernike Institute addresses selected problems in materials science in a comprehensive approach. This involves the entire chain of knowledge: modelling, synthesis, characterization, physical properties, theory and device functionality. This approach has made the institute world-renowned in areas such as membrane biology, molecular motors, organic solar cells, multi-ferroics and spintronics in graphene. The research activities of the Zernike Institute are organised along two research lines: Biomolecular and Bio-inspired Functionality and Nanostructured Materials for Electromagnetic Functionality. Researchers of the Zernike Institute design modern materials that enable control at the atomic and molecular level, and that give access to unprecedented functionality. They build this functionality in increasingly complex architectures with unique combinations of materials. Some examples are domain- and interface-engineering of materials for electronic devices, the bottom-up design of dynamic (bio) hybrid systems and the synthesis of functional cellular systems. This approach leads to new generations of materials with properties often found in nature: energy efficient, highly responsive, adaptive and self-renewing materials.



Student exchange

Both undergraduate and graduate students from partner universities can spend up to 10 months at the faculty as guest students, following courses and/or engaging in research projects of variable duration. Guest students are waived tuition fees and have unlimited access to all student services at the University of Groningen. In addition to bilateral partnerships, the faculty takes part in mobility programmes funded by governmental institutions such as Science without Borders or university consortia within Erasmus+.

Acceptance

The acceptance of exchange students is subjected to place availability and their compliance with the English proficiency requirements. In the case of coursework, the student's course plan is subjected to approval at the department of choice (discipline related). In the case of a research project, the research plan must be approved by the host supervisor.

Services for exchange students

Our Exchange Office guides incoming exchange students through their application and registration and refers them to the university housing agent. The University of Groningen takes care of visa application procedures for incoming non-EEA students whose stay is longer than 90 days. In the case of short stays, the exchange office will provide students with an invitation letter, which they will be able to use for a short-stay visa application at the Dutch embassy of their home country.

Research mobility

Exchange students can engage in research projects of variable duration (possibly in combination with coursework). Students who wish to carry out a research project should contact the prospective host supervisor at one of the faculty research institutes www.rug.nl/research/fmns/ before applying at the Exchange Office. More information on the application procedure and the entry requirements can be found on www.rug.nl/fwn/fmns-programme/exchanges-and-short-stay/

Coursework mobility

The teaching is organised in terms *(periods or blocks)* of approximately 8 weeks each. The exam sessions take place at the end of each term. Two terms form one semester. The first semester is the fall semester (early September through late January) and the second semester is the spring semester (early February through late June). Exchange stays may involve one or two semesters of the same academic year.

Course units generally carry 5 European credits (according to the ECTS) each. We strongly recommend students to choose no more than three courses per term, or six per semester. Exchange students are strongly advised to choose same year's courses within one single discipline, in order to avoid course schedule conflicts.

English is the main language of instruction at the faculty (both at undergraduate and graduate level).

Short programmes

Summer research internships for undergraduates

The faculty offers undergraduate students from a number of partner universities summer research internships at the research institutes. Talented students may apply for a grant for accommodation and living costs. Candidates should be in their 3rd or 4th undergraduate year.

Appetizer programme for prospective PhD students

In consultation with the faculty research staff, candidate or prospective PhD students can apply for a grant covering the expenses of a short stay (for a maximum of two months) at the research institute of choice.

Summer schools

The research institutes at the faculty regularly offer summer schools for PhD students and research staff, for more information www.rug.nl/research/fmns/.
The University of Groningen hosts a range of summer and winter schools at undergraduate and graduate level in Groningen and elsewhere in the world, for more information www.rug.nl/summerschools.

Contact information

- **Degree-seeking students:**
  sciencebachelors@rug.nl,
  sciencemasters@rug.nl
- **Education portal:**
  www.rug.nl/fwn/education/
- **Exchange office:**
  exchange.science@rug.nl
- **Information about PhD degrees:**
  ggss@rug.nl
- **Research portal:**
  www.rug.nl/research/fmns/

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