SLOVENSKO
OGRODJE
KVALIFIKACIJ

Doktor znanosti/doktorica znanosti s področja kemije in kemijskega inženirstva

Selected qualifications

Magister inženir telekomunikacij/ magistrica inženirka telekomunikacij

Name of qualification	Doktor znanosti/doktorica znanosti s področja kemije in kemijskega inženirstva
Translated title (no legal status)	Doctor of Philosophy in the field of chemistry and chemical engineering
Type of qualification	Diploma tretje stopnje
Category of qualification	Izobrazba
Type of education	Doctoral education
Duration	4 years
Credits	240 credits

Admission requirements

• Completed second level study programme.
• Completed study programme for obtaining a university education, adopted before 11 June 2004.
• Completed study programme of a domestic or foreign university that educates for professions regulated by EU directives, or another uniform master's study programme (also with fields not related to chemistry and chemical engineering), which is evaluated with 300 ECTS credits.
• Completed study programme for obtaining a higher professional education, adopted before 11 June 2004, and at the same time study programme for obtaining a specialization. Such candidates are assigned study obligations in the field of chemistry and chemical engineering, which are essential for the continuation of studies in the scope of 30 ECTS, and prescribed by the Commission for Study Matters, with regard to the envisaged field of study prior to enrollment in the study programme.

ISCED field

Field
Tehnika, proizvodne tehnologije in gradbeništvo

ISCED subfield

subfield kemijsko inženirstvo in procesi

Qualification level

SQF 10
EQF 8
Third level

Learning outcomes

Qualification holders are qualified to:

General competences:

- developing completely new knowledge, concepts and methods based on concrete problems
- ability to introduce new methodologies in independent problem solving in the fields of chemical engineering, biochemical engineering, chemical environmental protection and sustainable development, chemistry and chemometry, and materials chemistry
- ability to use the acquired top knowledge in solving the most demanding qualitative and quantitative tasks in the field of chemistry, chemical and biochemical engineering
- identification and solution of the most complex problems using the most modern scientific methods and procedures in a given specialist field
- conducting scientifically supported analysis and synthesis in the field of chemical and biochemical technology and understanding the impact of technical solutions on environmental and social relations,
- holistic treatment of problems based on fundamental and advanced, analytical and synthetic approaches
- linking technical applications with finance, management and business organization
- effective communication, including in foreign languages, and the use of modern presentation tools
- publishing research results in reputable scientific journals and symposia

- understanding of management principles and business practices
- understanding of their professional and ethical responsibilities
- understanding the interdependence of several knowledge and procedures and the importance of using professional literature
- developing plans and strategies to achieve the most demanding goals
- ability to use appropriate software
- autonomy in professional and research work
- acquisition of knowledge necessary for cooperation with other research groups or development laboratories in production organizations.

Subject-specific competences:

- ability to use and develop information technology and advanced computer tools for systems thinking and environmental modeling
- ability to determine technologically and economically optimal configurations of (bio) reactor systems
- understanding the manner and importance of implementing the validation of new measurement procedures
- knowledge of formulation processes in a product with specific application properties
- knowledge of complex thermodynamic and transport models and areas of their application
- mastering and developing the theory and applications of modern mathematical programming in the synthesis of processes and other technical structures
- mastering mathematical modeling of chemical and biochemical processes
- design, optimization and transfer of processes to industrial scale
- mastering in-depth knowledge of chemical technology for understanding, describing and solving complex problems of planning and operation of chemical and biochemical processes, innovating existing processes and developing new processes and products
- mastering methodologies for preparing feasibility studies and economic evaluation of processes and projects
- understanding of safety, health and the environment and the ability to apply and develop the concept of sustainability (sustainability)
- understanding and ability to develop the concept of chemical product technology,
- use of acquired knowledge in the educational process at faculties, secondary technical schools and in the economy.

In addition to the above-mentioned common subject-specific competences, doctoral students will also receive the following narrower competences according to the chosen field of Chemical Engineering:

- development of new mathematical methods and optimization procedures in solving applied problems
- knowledge and development of practical possibilities for energy optimization and exploitation of renewable resources
- mastering the conceptual planning of sustainable processes
- ability to choose appropriate techniques, skills and other modern tools to solve problems in science
- managing uncertainty and risk in the decision-making processes of production or business process
- application of techno - economic optimization methods in order to evaluate the profitability of investment in energy systems
- comprehensive understanding and design of complex new industrial (bio) reactor systems
- development of new natural products with high added value
- ability to plan the execution of advanced biocatalyzed reactions in unconventional media
- identification of interconnections in environmental systems and creative search for improvement
- the ability to analyze the problem of wastewater treatment and the optimal choice of solution to the problem

In addition to the above-mentioned common subject-specific competences, doctoral students will also receive the following narrower competences according to the chosen field of Chemistry:

- ability to design and use process techniques to obtain new products with different properties
- planning the synthesis of new organic compounds and sovereign mastery of physical organic chemistry
- understanding of complex connections between structural properties of organic compounds, their reactivity and spectral characteristics
- independent design of chemical processes for the synthesis of new coordination compounds
- design of synthesis and structure of new polymers with desired properties
- knowledge and development of methods for controlled synthesis of nanoparticles
- independent planning of development research for the production of planned ceramic materials
- an in-depth understanding of the influence of the structure of materials on their physical and chemical properties
- use and design of laboratory procedures for sonochemical synthesis of nanoparticles of aqueous and non-aqueous solvents
- scientific evaluation of experiments for the design of polymer membrane formation processes after wet phase inversion
- knowledge of ways to optimize the impact of validation of new measurement procedures in the field of research and development, standardization and metrology (at the national and international level)
- usable, modifications and development of electrochemical sensors and methods for in-depth studies and comparison of different analytical systems
- introduction of key processes related to technical infrastructure in the work environment
- application and development of analytical methods for monitoring the surface properties of polymers and the stability of colloids.

Assessment and completion

The methods of assessment and testing of knowledge are specified in the curricula of individual subjects. The most typical are: regular tests (arithmetic and theoretical), written exam, oral exam, arithmetic exam, theoretical exam, seminar work, presentation of seminar work, problem solving, active work in lectures, master's thesis and oral defense of master's thesis. Methods of continuous assessment and assessment of knowledge are encouraged, thus enabling students to continuously monitor their own progress in their studies. Students can check the results of the exams via the Academic Information Subsystem (AIPS) and in certain subjects via the electronic support system Moodle. Institutions and course providers are always ready to provide students with additional explanations regarding assessment in person or via e-mail. The success of exams and studies is regularly analyzed and published in the Self-Evaluation Report of UM FKKT, which is published on the website: http://www.fkkt.um.si/sl/kakovost .

Progression

Students progress to the next year if they have fulfilled the following obligations with the study programme:

- Enrollment conditions for the 2nd year: all study obligations of the 1st year in the amount of 60 ECTS.
- Enrollment conditions for the 3rd year: all study obligations of the 2nd year in the amount of 60

ECTS.
- Enrollment conditions for the 4th year: all study obligations of the 3rd year in the amount of 60 ECTS.

Promotion under extraordinary conditions:
A student who has not fulfilled all obligations may, exceptionally, be approved by the Commission for Academic Affairs of the Faculty of Chemistry and Chemical Technology to enroll in a higher year if he/she has fulfilled more than half of the obligations, if he/she could not fulfill the obligations for justified reasons and if expected that he/she will fulfill his obligations.

Condition for obtaining certificate

The third level doctoral study programme in Chemistry and Chemical Engineering is completed by anyone who completes all the obligations prescribed by the study programme and thus collects at least 240 ECTS, has two original scientific articles in the field of doctoral dissertation published in journals from the Science Citation Index (SCI), one published until the defense of the doctoral dissertation and the other accepted for publication until the promotion, and prepares and successfully defends the doctoral dissertation. The second scientific article can be replaced by an accepted international patent (EU, USA, Canada, Korea, Japan) or a new state-of-the-art application.

Awarding body

University of Maribor, Faculty of Chemistry and Chemical Engineering

URL

https://www.fkkt.um.si/studenti/