SLOVENSKO
OGRODJE
KVALIFIKACIJ

Doktor znanosti/doktorica znanosti s področja tekstilstva, grafike in tekstilnega oblikovanja

Selected qualifications

Name of qualification	Doktor znanosti/doktorica znanosti s področja tekstilstva, grafike in tekstilnega oblikovanja
Translated title (no legal status)	Doctor of Philosophy in the field of Textile Engineering, Graphic Communication and Textile Design
Type of qualification	Doktorat
Category of qualification	Izobrazba
Type of education	Doctoral education
Duration	3 years
Credits	180 credits

Admission requirements

Candidates can enrol in the doctoral study programme Textile Engineering, Graphic Communication and Textile Design if:
• they have completed a second level study programme,
• study programme for professions under EU directives or other unified master study programmes accredited with 300 credit points according to ECTS,
• university study programmes adopted prior to 11 June 2004,
• a master's study programme or specialist study programme and prior to it a university study programme; candidates shall be awarded with 60 credit points according to ECTS based on their application according to the law,
• a specialist study programme and prior to it higher professional study program; additional requirements shall be determined for the candidates in the range between 30 and 60 credit points according to ECTS.
• Graduates from universities abroad can also enrol in the doctoral study programme. The equivalence of the education acquired at a university abroad shall be established with the procedure for recognition of foreign higher education for admission to further study in accordance with Statute of the University of Ljubljana.

ISCED field

Field
Umetnost in humanistika

ISCED subfield

subfield interdisciplinarne izobraževalne aktivnosti/izidi, pretežno umetnost in humanistika

Qualification level

SQF 10
EQF 8
Third level

Learning outcomes

Qualification holders are qualified to:

- in-depth understanding of theoretical and methodological concepts of textiles, graphic and interactive communications and the theory of textile design,
- developing new knowledge of textiles, graphic and interactive communications and theory of textile design,
- addressing the most demanding problems by testing and improving familiar or discovering new solutions of textiles, graphic and interactive communications and theory of textile design,
- leading the most demanding work systems in the field of textiles, graphic and interactive communications and the theory of textile design,
- leading scientific research projects of textile, graphic and interactive communications and the theory of textile design in the general professional or science,
- critically evaluating the science of textiles, graphic and interactive communications and the theory of textile design,

- developing social and communication abilities of team work management also in terms of projects based on integrating scientific laws of different areas,
- developing professional, ethical and environmental responsibility,
- using modern tools, skills and principles, especially in terms of ICT in everyday professional and scientific research work.

(Textile engineering)

- Conquering mathematical tools for the study of technical mechanics, understanding mechanical principles for the study of technical mechanics, mechanical laws and principles in material mechanics and operation of equipment, upgrading basic models with specific features and developing deductive problem solving in textile technology.
- Acquiring knowledge in physical organic chemistry, which is essential in studying chemically oriented courses in textile sciences and technologies, insight into modern analytical methods of organic chemistry, the ability to select the most appropriate method in practical problem solving in chemical textile technology; a prerequisite for independent problem solving in the research field.
- Understanding the laws behind the physics and mechanics of fibre forming polymers, the ability to connect the supramolecular and morphological structure with the properties of polymers, the ability to choose fibre forming polymers with respect to the required properties of the finished product, knowledge of types of use of fibre forming polymers in different areas and understanding the influence of factors in the production and use of fibres and finished products.
- Acquiring knowledge of high-performance fibres for development and use in technologically highly developed products for technical purposes, the ability to use theoretical knowledge in terms of structure, properties and application of polymeric fibres for constructing high-performance technical textile products and fibre composites, the ability to choose high-performance fibres professionally and according to the required properties of the finished product.
- Insight into non-conventional fibres and new synthetic fibres from biopolymers that are not crude oil-bound, knowledge of modern technologies leading to the synthesis of biopolymers from renewable raw materials, properties and advantages of their use, the ability to select fibre professionally for the development of environmentally friendly products, knowledge of the problems in obtaining and using them.
- Understanding the connection between the structure and properties of fibrous polymer and their biodegradability and reproducibility, ability to recognise the needs for waste separation of textile materials, knowledge of recycling processes for polymer materials and the impact of recycling on their properties, ability to find optimal solutions in the production of textile products, taking into account ecological design and the life cycle for each product.
- Acquiring knowledge of state-of-the-art analytical methods for the investigation of the structure of molecules in the nanometre scale, supramolecular structures in hard aggregate state, anisotropy, thermal properties, diffusion phenomena, viscoelasticity and fibre density, choosing appropriate analytical methods for the investigation of the chemical and physical properties of fibre forming polymers and their changes in various processing methods, applying knowledge in special fields of investigation, such as archaeological and historical textiles, textile research in forensics.
- Gaining knowledge and skills in programming and numerical methods, insight into mathematical software packages relevant in analysing measured results, upgrading statistical thinking and approach to research, using modern statistical thinking and approach to research, modern statistical tools in scientific research or professional work, understanding the basics and practical applications of the learnt methods in textile industry.
- In-depth study of the structure and properties of single, blend, spun and textile cables, single-layered and multi-layered textiles, knitwear and knitted fabrics, 3D textiles, extruded, melt-blown and spun bond non-woven textiles, of integrating the effect of structural and production parameters on the final properties of the product, of planning textiles for different end application with prerequisite physical, mechanical, permeable and other properties, mastering the most demanding

technologies of textile manufacturing, understanding the impact of each stage to the properties of the textile and learning the advanced methods and equipment for testing mechanical properties of textile products.

- Gaining knowledge on theoretical basics of refining processes and procedures of chemical and physical modification of textiles, the ability to inspect the mechanisms of the processes, understanding the impact of factors to the quality of the implementation of procedures and as a result the properties of the final products, the ability to integrate theoretical and applied knowledge in structural, design, mechanical, physical and chemical properties of textiles and textile refining and care procedures, the most technologically advanced chemical textile procedures and means for their implementation, gaining the ability to select a procedure according to the required functional properties of the product.
- Introducing new technologies for modifying textiles, including nanotechnological procedures, such as sol-gel technology and plasma technology, microencapsulation, biotechnology.
- Insight into the mechanisms of modifying textile surface and methods for their characterisation, as well as knowledge of ecological and economic advantages and disadvantages of the procedures.
- Insight into the structure, properties and usability of dyes and pigments in chemical textile technology, detailed knowledge of the characteristics of dyes and pigments, enabling an objective evaluation of textile products and achieving their greater competitiveness, acquiring relevant knowledge of colour measurement theory and practice, gaining in-depth knowledge of colour as a phenomenon of sensory perception, understanding the problems associated with perception and colour rendering in different media.
- Insight into the structural properties of chemical agents for textile refining and care, using the appropriate agents, the right concentration and combination and the ability to make an ecological decision on how to make state-of-the-art resources and methods for producing textile fibres more functional and their care.
- Developing special technical two- and three-dimensional textiles with high added value for new applications in different economic areas, such as medicine, pharmacy, sports, construction, agriculture, aviation, understanding the requirements of functional properties, individual structures and manufacturing procedures, distinctive application features, specific examinations and standards.
- In-depth knowledge of the impact of individual processes in the textile industry, waste and products on the environment, gaining an ecological awareness, familiarising with the environmental protection legislation and ecological standards of the industry, of evaluating and solving specific ecological problems in the industry, familiarising with environmental monitoring and industrial waste water treatment and air purification technologies, of using ICT for transmitting and processing data and following innovations in environmental protection.
- Gaining knowledge in production management, including the understanding of the production development, productivity and improvements, planning work processes through network planning methods, recognising the needs for investments, of recognising and evaluating costs incurred in the work process, understanding and being able to solve specific work-related problems by using professional methods, such as SWOT analysis, value analysis, job systematisation and evaluation of the work complexity, developing skills for planning and calculating the technological requirements of products and services. Graphic and interactive communication
- Knowledge of the latest printing technologies. Gaining knowledge required for constant efficient following of innovations in this fast-paced field of expertise of modern technology.
- Becoming aware of the importance of innovation and uniqueness in designing new ideas for printing value-added products.
- Obtaining the necessary knowledge required to understand the basics and have a systematic overview of the direction of development of interactive communication in new media.
- Understanding the basics in preparing and processing multimedia content, overview and understanding the basics of user interfaces that enable the implementation of user-centred interactive services. – Conquering and modernising statistical ways of thinking and research approach. Learning about modern statistical tools and gaining knowledge for the practical use of

statistical methods in graphic technology. – In-depth study of basic and advanced methods of information generation and processing in different graphic media. Learning about the theoretical bases on the functioning of different media and their applications. – Gaining detailed knowledge of the impact of individual processes of the graphic industry on the environment. Learning about modern environmental protection legislation and ecological standards related to the field of expertise.

- Acquiring knowledge about the use of mathematical modules (matrix, CLUT) and methods of colour mapping between different colour schemes characteristic for graphic and media communication technology.
- Gaining insight into physical and chemical principles of modern measurement methods for analysing and designing modern application in graphic technology. Students are able to address specific complex problems, analyse results obtained by individual research methods, synthesise the acquired partial solutions and critically evaluate the integrity and applicability of the integral solution.
- Finding new innovative solutions in working with different modern materials. Students are able to find ideas and put theoretical knowledge into practice. Students are able to create new effective work procedures or to increase work efficiency of the implemented procedures. – Strengthening the ability to communicate and actively participate in team work and finding new solutions. Students are able to present practical knowledge required by an independent innovative graphic technician so to plan new functional value-added products.
- Obtaining knowledge required for understanding and solving basic problems of the time-varying electromagnetic fields and transient phenomena, which are important for understanding of the operation of simple systems of printed electronics.
- In-depth study of the impact of technological development, historical and artistic styles to typeface. Examining the role of the content of the text and the information carrier to the typeface selection and the requirements and ways on testing visibility, readability and legibility.
- Learning, understanding and critically analysing visual and secretive constitutional, compositional, aesthetic, message and communicative characteristics of a graphic product in terms of plastic and analytical point of view.
- Gaining knowledge in intellectual property, innovation protection in science and technology and applicative use in the selected field of expertise of the candidate.
- Understanding the theoretical problems associated with perception, depiction and measuring colour in different media. Examining the latest theoretical approaches and modules of the field of expertise.
- Addressing specific work-related problems based on the knowledge of structure and properties of graphic and packaging materials,
- Understanding the interaction between the product and packaging and developing skills in controlling and analysing modern requirements for the production of graphic and packaging products.
- In-depth knowledge of image processing methods and image analysis for an objective evaluation of the quality of print. Understanding the basics of software tools for designing macros and add-ons that enable automatic and objective evaluation or analysis.
- Basic experience in printed electronics, which is essential in the application of the systems in practice. Ability to find new innovative solutions both in printing simple printed electronic systems and in their final application.
- Gaining knowledge of instrumental methods that enable objective evaluation of the interactions in printing, which are of great importance in achieving the highest level of repeatability and quality.
- Gaining knowledge of the functional use of plastic parameters, fractal proportional, rhythmic and other harmonic relations, especially between photography and typeface and their arrangement, as well as different combinations of tonal/colour value and colour contrasts and other harmonic relations in analytical examination of the quality of graphic design.
- Getting to know the processes in design, manufacturing and distribution of products and services. Familiarising with product management.

- Gaining knowledge of programming and numerical methods related to graphic problems. Gaining skills of independent research work using mathematical programme packages important for analysis of measured results, processing of digital images, etc. – Insight into the selection and quality of materials and manufacturing techniques used in the past in graphic arts, manufacturing and industry. Textile design
- In-depth study of fashion theory and specific methods of clothing design related to sociological, psychological and historical bases of the basic functions and motives of fashion.
- Understanding and addressing important issues in artistic productive thinking, conceptualisation, articulation, materialisation and public presentation and in terms of the structure of artistic language and models of verbalisation that lead to the manifestation of the idea and its message.
- Placing fashion phenomena and clothing culture into general social contexts and critical explanatory frameworks and understanding, reading and interpreting clothing and texts (semiotics of dress).
- Developing individual expression according to technologically innovative industrial production and integrating socio-psychological parameters and theoretical thought sin terms of art with social humanistic specific time and space.
- Insight into theoretical, practical and analytical modernisation of the general fashion design of clothing and other accessories in connection with technological research of textiles.
- Recognising the needs of potential customers, using tools to promote creativity and to test their own ideas and choose from them.
- Designing and engineering textiles for interior and exterior design use by understanding and evaluating architectural laws and meaning in the general cultural context.
- Deeper analysis of style trends and their impact both in the past and present by understanding the relationship between clothing, the body and the visual language in relation to clothing.
- Conquering knowledge in integrating technological knowledge to the very process of designing a textile product of added value, i.e. manufacturing a meaningful and complete in design virtual presentation while examining the possibilities of using more advanced graphic software tools for developing the visual image of a textile product.
- Understanding the artistic trends of European modernism and historical avant-garde, including their connections with radical political parties through the prism of the conflict between nationalism and cosmopolitanism.
- Functional use of basic artistic parameters, fractal proportional rhythmic and other harmonic relations by using different combinations of the colour value scale and colour contrasts in examining the quality of textile design or textile products analytically. – in-depth theoretical and practical knowledge of 2D/3D clothing patterns and the possibility of a new approach in designing a functional and structural relationship between the clothing (textile) and the body.
- Developing the ability to understand, critically evaluate and describe the visible and invisible constitutional, sampling, aesthetic, message and communication features of fashion photography in terms of analytical, photographic and fashion design relating to the distribution of fashion photography and other visual messages in the cultural environment.
- Obtaining knowledge in differentiated knowledge of the role of costume design and its principles in theatre, opera, dance, film, television and video and in terms of the integration of costume design in dramaturgic, directing and stage design concept.
- Acquiring knowledge of media culture in connection with fashion, the fashion industry and the role of media in promoting and structuring fashion in contemporary times.
- Acquiring knowledge in active textiles, the development of which is connected with biotechnology, IT, microelectronics, microelectromechanical equipment, the development of wearable computers and nanotechnology and their application in modern design or clothing and textiles.
- Conceptual thinking by interdisciplinary examination and by integrating different disciplines and media and liberating from thematic standards.

Assessment and completion

According to the Statute of the University of Ljubljana, the exam scores range from 1 to 10, whereby a positive grade is from 6 to 10. Exams of the study program shall be written and oral and the preparation and oral presentation of seminars will also be evaluated.
The results of exams are published on the higher information system of the Textile Department (VIS-OT). Details are provided to students during office hours of professors.

Progression

In order to advance from the 1. to 2. year of the doctoral study program, students must complete all the requirements in the amount of at least 45 ECTS. Doctoral students need to obtain at least 20 ECTS in compulsory courses. Candidates, who have completed all the requirements of the organised courses from the 1. and 2. year and have obtained a consent for the doctoral thesis from the UL Senate, can progress to the 3. year of the postgraduate doctoral study program. The final, third year is intended for individual research work and the production and defence of the doctoral thesis.

Condition for obtaining certificate

In order to complete the study program and obtain the scientific title of Doctor of Science, candidates need to successfully complete all the requirements of the study program and successfully defend the doctoral thesis. Another requirement for doctoral students is also the publication of at least one scientific article on the topic of the doctoral thesis in a SCI, SSCI or A&HCI indexed journal. The doctoral student needs to be the primary author of the article. The scientific article needs to be published or accepted for publishing before defending the doctoral thesis.

Awarding body

Faculty of Natural Sciences and Engineering, University of Ljubljana

URL

https://www.ntf.uni-lj.si/en/