

Product Design,

2. cycle master study programme

1 General description of the programme

The 2nd level postgraduate master's study programme of Product Design lasts two years (4 semesters). A student has to acquire 120 ECTS points. The study programme is aligned with the Bologna directives. It represents a possibility of further advanced studies for graduates from the 1st level graduate study programme Mechanical Engineering in the field of industrial design. The study programme is based on the method "from inside out", which integrates methods from mechanical engineering used at different levels of a product design process.

The study programme is related to other study programmes in Europe. Three study programmes from the high-ranked universities according to Shanghai university rankings) were taken for the basis and comparison: 1. M. Sc. in Integrated Product Design, Delft University of Technology, Netherlands; 2. M. Sc. Design & Engineering, Politecnico di Milano, Italy; 3. Master's degree (Ing.), Industrial design, Brno University of Technology.

2 Short description of the study modules

Program has two modules – “Product Design” and “Textile and Fashion Design”.

Product Design

The students of this study module gain the advanced theoretical and practical knowledge needed for modern product design of mass produced products, structures and machines. They are trained to combine the basic knowledge with modern procedures and design methods with emphasis on functional, aesthetical and ergonomical aspects of the product. The study is designed to teach the students how to work as a part of a design team on modern CAD equipment and how to effectively apply intelligent and expert systems in the product design process. The students are encouraged to develop and assess new concepts and practical approaches that help shorten the design processes and thus contribute towards product cost reduction.

Textile and Fashion Design

The students of this module will gain the theoretical and practical knowledge needed for designing textile forms. Their training comprises the integration of knowledge on the properties of textile materials, colour science and colour studies, presentation techniques and virtual catalogues, developing collections, visual communications, eco-design, multi-functionality in design, etc. Students can specialise in different fields, e.g.

fashion design, designing fashion accessories and footwear, designing textiles for interiors, creating collections and styles, etc..

3 General learning outcomes and competencies of the students

A graduate student of this programme is an expert with theoretical and methodological knowledge for solving problems by planning, managing and implementing complex professional tasks within a wide field of product design and at various workplaces. Students have possibilities for obtaining high-quality knowledge during their studies, and also skills and expertise within the fields of product design. The individual work with the students enables transferring of professional values and fostering the positive self-esteem of the students. This, in addition to deep knowledge, contributes significantly to the work successes of our graduates. Graduates of this study programme are able to manage the procedures and processes within the field of product design. They are able to design, construct, manufacture and maintain products with great responsibility, taking into account the professional excellence, social utility, ethical responsibility, commitment to professional ethics and criteria for the environmental integrities of their creations. This programme enables the graduate to obtain a broad knowledge by integrating theoretical concepts with professional and applied skills, and the graduate can develop his (her) skills for transferring and applying theoretical knowledge in practice for creative solutions of professional work problems.

The main subject-specific competencies that can be obtained by the 2nd level postgraduate master's study programme Product Design.

- An ability of analysis, synthesis and predicting solutions and consequences.
- Mastering of research methods, procedures and processes of product design, development of critical assessment and self-assessment.
- An ability to apply knowledge in practice.
- Autonomy in professional work.
- Development of communication skills, particularly communication in international environment.
- Ethical reflection and commitment to professional ethics.
- Cooperation, team work in an international environment, backed by social and cultural sensitivity and language and communication skills, partly acquired through use of teamwork experience and through study periods abroad.

4 The main subject-specific learning outcomes and competencies of the students

The main subject-specific competencies that can be obtained by the 2nd level postgraduate master's study programme Product Design.

- Knowledge and understanding of product design development.
- An ability to solve concrete working problems with use of design methods and product development process from product function.

- Coherent management of basic knowledge from the field of industry design, technology and knowledge integration from different technical fields and applications.
- An ability of positioning new interpretations and interpretations in context of product design.
- Understanding of general structure of product design and its connection with sub-disciplines.
- Understanding and use of methods of critical analysis and theory development and their use in solving of concrete working problems.
- Development of skills in use of knowledge in the field of product design.
- Use of IT and systems in the field of product design.
- Development of innovative products and their combinations for meeting needs of individual consumers based on the balancing of interests between designers, users, industry and society with respect to ethics.
- Professionalism in the execution of the entire process of creating product with a focus on conceptuality and skills in implementing and managing this individuality either as a member or as a team leader.
- Knowledge of relevant technical, human, aesthetic and environmental issues and organizational and economic aspects of products. The ability to use these in terms of their involvement in the product development.
- Selection and use of engineering materials.
- Choice of strategies and methods of spatial modelling, selection of appropriate software and construction of complex computer geometric models.
- Systematic products lifecycle management through technologies, methods, tools and systems used for product lifecycle management.
- Participate in or conduct simultaneous engineering, systematic and simultaneous approach by providing design goals and knowledge of guidelines and recommendations for target-led product development.
- Selection, use and integration of software tools for analysis, design, implementation and handling with intelligent management systems.
- Integration of discipline with social, cultural and economic frameworks.
- Evaluation of the semiotic ambiguities of space and its elements in the scientific, social and cultural dimension.
- Analysis, synthesis and critical evaluation of the aesthetic theses and semiotics of form.
- Planning, designing, modelling, optimization, evaluation, management, design and manufacture of technologically advanced products and systems that can be marketed on the world markets.
- Development and application of scientific methods in a broad spectrum of problems and thus fast in response to new circumstances at home and abroad markets.
- Knowledge of the theory and practice of graphic rendering.
- Mastering the principles of two- and three-dimensional design and translation of content into a form.

- Management of objectives, methods, procedures and tools to ensure ergonomic suitability of products.
- Creation of complex assembled product, and the product analysis from the aspect of the materials and implementing procedures in the production.
- Independent and creative solving design problems using the technology of reverse engineering.
- In-depth knowledge of the opportunities, advantages and practical use of prototyping technologies.
- Mastering the principles of colour harmony.
- An ability to design mechanical elements, devices and machines.
- An ability to apply and develop computer-aided design.
- An ability to apply and develop processes and tools for modelling, optimisation and simulation of processes, machines, devices, manufacturing methods, products and production facilities.
- An ability to design and develop machines, devices and facilities for the power, process and environmental engineering.
- An ability to devise, develop and apply the modern production technologies, production automation and new production concepts.
- An ability to managing with information, material and energy flows by devising, designing, assembly, disassembly and maintenance of products.
- An ability for managing the current production methods and technologies, as well as analysing, evaluating and judging of existing production methods and technologies.
- An ability to organize and manage a production process.
- An ability to provide a convenient quality of products by applying appropriate measurements and quality assurance.
- An ability to conduct measures for flawless functioning, maintenance, and environmental correctness of products during their total lifetime.
- An ability for interdisciplinary understand the activities in the production systems.
- An ability to permanently develop skills by application of knowledge on the specific professional area.
- An ability to apply modern computer, information and communication technologies on the professional area of product design.
- Knowledge and understanding of historical development of product design and its disciplines.

5 General curriculum

The postgraduate master study program of Product Design takes two years (4. semesters) in total amount of 120 ECTS credit points.

Master study programme of Product Design is divided into:

Part	Part of study	Duration	ECTS credits
1	Regual and elective courses	2 years (4 semesters)	102
2	Master theis	4 th semester	18
Total:		2 years	120

6 Detailed curriculum

1. year							
Subject	1 st semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
THEORY AND PRAXIS IN DESIGN	25	5	10	40	80	120	4
COLOUR AND SPACE STUDIES	30	0	30	60	120	180	6
MATERIALS AND TECHNOLOGIES IN DESIGN	40	5	15	60	120	180	6
DESIGN VIZUALIZATION	15	0	30	45	75	120	4
COMPUTER AIDED INDUSTRIAL DESIGN	40	0	40	80	100	180	6
MECHANICS IN DESIGN	30	0	35	65	55	120	4
Together semester:	180	10	160	350	550	900	30

Subject	2 nd semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
BIONICS AND BIOMECHANICS	25	10	20	55	65	120	4
CREATIVE FORM DESIGN	25	10	25	60	120	180	6
ERGONOMICS IN PRODUCT DESIGN	25	10	20	55	125	180	6
MULTIFUNCTIONALITY DESIGN	30	15	30	75	45	120	4
METHODOLOGY OF DESIGN	25	10	20	55	65	120	4
ADDITIVE TECHNOLOGIES AND 3D PRINTING	30	10	10	50	130	180	6
Together semester:	160	65	125	350	550	900	30
Together year:	340	75	285	700	1100	1800	60

Modul: Product Design

2. year – modul Product Design							
Subject	3 rd semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
NUMERICAL SIMULATIONS IN ENGINEERING	30	0	40	70	110	180	6
AESTHETICS AND SEMIOTICS	20	20	0	40	140	180	6
GOAL DRIVEN PRODUCT DEVELOPMENT	45	10	20	75	105	180	6
PRESENTATION TECHNIQUES AND VIRTUAL CATALOGUES	30	5	30	65	55	120	4
REVERSE ENGINEERING	25	10	20	55	65	120	4
ELECTIVE SUBJECTS	30	0	30	60	120	180	6
Together semester:	180	45	140	365	535	900	30

Subject	4 th semester				Cont. hours	Individ. work	Hours	ECTS
	L	S	T	K				
DESIGN SYNTHESIS AND FINALIZATION	30	10	30	0	70	110	180	6
ELECTIVE SUBJECTS	30	0	30	0	60	120	180	6
MASTER THESIS	0	0	0	10	10	530	540	18
Together semester:	60	10	60	10	140	760	900	30
Together year:	240	55	200	10	505	1295	1800	60
Together 2 years:	580	130	485	10	1205	2395	3600	120

L – lectures, S – seminar; T – tutorial; K-konsultation

Modul: Product Design

Elective subjects 3 th semester							
Subject	3 th semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
DESIGN AND DEVELOPMENT OF INTERIOR PRODUCTS	30	10	20	60	120	180	6
GRAPHIC DESIGN	30	0	30	60	120	180	6
INTERDISCIPLINARITY OF MATERIALS COLOUR	30	15	15	60	120	180	6

Elective subjects 4 th semester							
Subject	4 th semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
DESIGN AND DEVELOPMENT OF FASHION ACCESSORIES AND FOOTWEAR	30	0	30	60	120	180	6
VEHICLE DESIGN	30	0	30	60	120	180	6

Modul: Textile and Fashion Design

2. year – modul Textile and Fashion Design							
Subject	3 rd semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
CAD PATTERN DESIGN OF TEXTILE FORMS	30	20	30	80	70	150	5
SIMULATION AND VISUALISATION OF 3D TEXTILE FORMS	30	20	30	80	70	150	5
FABRIC ENGINEERING DESIGN	30	20	30	80	70	150	5
PRESENTATION TECHNIQUES AND VIRTUAL CATALOGUES	30	5	30	65	55	120	4
PROJECT WORK	0	45	0	45	105	150	5
ELECTIVE SUBJECTS	30	0	30	60	120	180	6
Together semester:	150	110	150	410	490	900	30

Subject	4 th semester				Cont. hours	Individ. work	Hours	ECTS
	L	S	T	K				
DEVELOPMENT OF FABRIC AND CLOTHING COLLECTIONS	30	20	30	0	80	100	180	6
ELECTIVE SUBJECTS	30	0	30	0	60	120	180	6
MASTER THESIS	0	0	0	10	10	530	540	18
Together semester:	60	20	60	10	150	750	900	30
Together year:	210	130	210	10	560	1240	1800	60
Together 2 years:	550	205	495	10	1260	2340	3600	120

L – lectures, S – seminar; T – tutorial; K-konsultation

Modul: Textile and Fashion Design

Elective subjects 3 th semester							
Subject	3 th semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
TEXTILES DESIGN	30	0	30	60	120	180	6
FASHION DESIGN AND DEVELOPMENT OF CLOTHING	30	0	30	60	120	180	6
MODERN LINEAR AND FLAT TEXTILE STRUCTURES	30	15	15	60	120	180	6

Elective subjects 4 th semester							
Subject	4 th semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
DESIGN AND DEVELOPMENT OF FASHION ACCESSORIES AND FOOTWEAR	30	0	30	60	120	180	6
SUSTAINABLE FASHION AND TEXTILES DESIGN	30	10	20	60	120	180	6
DEVELOPMENT OF TECHNICAL TEXTILES	30	15	15	60	120	180	6