Lodz University of Technology

Study programme

Faculty:	Faculty of Organization and Management
Major:	Paper and Printing Technology
Level of study:	second-cycle programme (magister)
Form of study:	full-time studies
Academic year:	2026/27

Table of contents

Basic information	3
Learning outcomes (in relation to the PQF)	4
Matrix of course modules in relation to learning outcomes and curriculum content	5
ECTS - subjects	8
ECTS indicators	10
Methods of verifying and assessing learning outcomes	11
Professional internships	12
Characteristics of the course	13
Education program	15

Basic information

Name of the field of study:	Paper and Printing Technology
Level of study:	second-cycle programme (magister)
Study profile:	general academic
Form of studies:	full-time studies
Duration of studies (number of semesters):	3
The number of ECTS points required to complete studies:	90
Total number of hours of classes:	1125
The number of ECTS points a student obtains as part of classes conducted with the direct participation of academic teachers or other persons conducting classes:	45
Professional title awarded to graduates:	magister
ISCED code:	0722
Language of study:	polish

Assigning the course to the disciplines to which the learning outcomes relate

Discipline	**Percentage share**
Chemical engineering	55%
Material Engineering	25%
Mechanical engineering	20%

Learning outcomes (in relation to the PQF)

No.	Learning outcome code	Learning Outcome Content	Reference to the universal characteristics of the first level of PRK	Reference to the second-level characteristics of the PRK, taking into account the second-level characteristics enabling the acquisition of engineering competences
1	**2PIP1**	Has a thorough knowledge and understanding of phenomena, processes and modern technologies in papermaking and printing, as well as development trends in and research directions in contemporary papermaking and printing.	P7U_W	P7S_WG, P7S_WK
2	**2PIP2**	Possesses advanced theoretical knowledge covering key issues related to production media, raw materials and products of the paper and printing industry, production control and management systems, technologies, and equipment used in the paper, printing, and paper processing industries. Knows and understands research and design methods and tools, including those utilizing artificial intelligence.	P7U_W	P7S_WG
3	**2PIP3**	Knows and understands the economic, business, legal and ethical conditions of professional activity in the paper, printing and paper processing industries, including the principles of intellectual property protection.	P7U_W	P7S_WK
4	**2PIP4**	Is able to use learned knowledge to formulate hypotheses, identify, analyze, and solve unusual problems in papermaking and printing, even with limited input data. Can perform advanced computer calculations and simulations, and design papermaking and printing systems using appropriate tools, methods, standards, scientific literature, information and communication technologies.	P7U_U	P7S_UW
5	**2PIP5**	Is able to communicate at an advanced level on specialist topics of papermaking and printing with a diverse audience, formulate opinions, lead discussions, prepare documentation and reports, also in a foreign language at level B2+ of the Common European Framework of Reference for Languages, using specialist literature and terminology used in papermaking and printing.	P7U_U	P7S_UK
6	**2PIP6**	Is able to manage team work and cooperate with others within team activities, takes on various roles in teams , presents work results using modern techniques, and independently expands his/her knowledge and skills.	P7U_U	P7S_UO, P7S_UU
7	**2PIP7**	When solving cognitive and practical problems in the field of papermaking and printing, is able to discuss with experts and critically evaluate the learned knowledge and the received information.	P7U_K	P7S_KK
8	**2PIP8**	Is ready to perform professional roles responsibly, taking into account changing social and economic needs, including developing professional achievements, observing and developing the principles of professional ethics and working to ensure compliance with these principles.	P7U_K	P7S_KO, P7S_KR

Matrix of course modules in relation to learning outcomes and curriculum content

No.	Course name	Program content	2PIP1	2PIP2	2PIP3	2PIP4	2PIP5	2PIP6	2PIP7	2PIP8
1	Control, Optimization and Production Management Systems	Process and machine control in the paper and printing industries. Stages of designing, modeling, and optimizing production process control systems. Fundamentals of enterprise management systems and principles of production system planning.		x				x		
2	Market Economy	The main concepts related to the market economy, the main types of economic entities and the principles and problems of their functioning, as well as the criteria for assessing the effectiveness of their functioning.			x		x			x
3	Managing Industrial Utilities in a Circular Economy	Modern energy and water management in the pulp and paper industry, taking into account the characteristics of the main sources using these media and explaining the energy and water cycles in the paper mill, including appliances and parameters characterizing the energy and water efficiency of the processes, taking into account closed water and steam cycles.		x	x	x				
4	Advanced Paper and Printing Processes and Materials	Detailed analysis of the technological processes of the pulp and paper industry (transport and storage, mixing of fibrous suspensions, particle separation processes) and materials produced and used in the paper and printing industry (types of materials, quality control methods, innovative technological solutions in the preparation, printing and finishing of printing products).	x	x		x				
5	Computer-Aided Design Work	The use of IT tools in packaging design and the construction of paper and printing machines and equipment, as well as the selection of IT tools in graphic design processes.				x				
6	Multilayer Materials	Manufacturing methods, structure, properties, defects and testing methods of multi-layer paper materials, ranging from lightweight tissue papers, solid papers and boards, and corrugated boards. Paper composites containing layers made of other materials are also discussed.	x	x		x				
7	Modern Cellulosic Processes and Materials	Modern solutions in the field of pulping (wood preparation, pulping, bleaching). Products diversifying the use of second-generation plant cellulose.	x	x		x				
8	Foreign Language for Specialist Purposes	English language course at B2+ level; developing the ability to communicate effectively in speech and writing, using specialist terminology from the field of study. Building a terminological foundation supporting autonomous language use and engagement with more advanced academic topics.					x			
9	Advanced Course on Physics and Chemistry of Paper	Aspects of paper structure formation, starting from the hierarchical structure of cellulose fibers, the nature of interfiber bonds, and the mechanics of fibrous structures. Advanced chemical and physical properties of paper are discussed, considering this material as a complex three-dimensional structure.		x			x			
10	Operation of Machines and Maintenance of Production Lines	Selected issues related to the operation, maintenance, and condition assessment of machines used in paper production, printing, and converting. Topics related to quality improvement, adjustment of operating parameters, and identification of operational faults.		x		x				

No.	Course name	Program content	2PIP1	2PIP2	2PIP3	2PIP4	2PIP5	2PIP6	2PIP7	2PIP8
11	Quality Control and Defects of Paper and Printing Products	Print quality control and quality control systems and principles for paper products. The causes of defects at specific stages of the production process – from paper production and processing through printing – and methods for eliminating and minimizing them.		x		x				
12	Methods of Securing Papers and Prints	Anti-counterfeiting methods used in the production of paper and printed matter. The process of producing secure prints and technical means of verifying the authenticity of secure prints.	x		x		x			
13	Printed Electronics	Fundamentals of printed electronics, with particular emphasis on the technology of applying functional layers using printing methods. The properties of paper as a printing substrate and their impact on the quality of electronic components. Design and fabrication of simple electronic structures on paper with specifically selected functional properties.		x			x			
14	Operating Conditions for Enterprises	The company's operating and investment activities, taking into account the most important management criteria: inventories, receivables, and the cost and structure of capital, as well as the evaluation of investment projects. Principles of preparing financial statements.			x		x			x
15	Biorefineries and Bio-based Materials	Possibilities of using biorefinery technologies in pulp and paper industry in the energy and product context and the possibility of using materials of natural origin (biomaterials) to obtain biodegradable and compostable cellulose products.	x							
16	Color and its Role in the Marketing of Paper and Printing Products	Color science and color control systems in printing. The role of color in the marketing of paper and printing products.	x				x			
17	Commercialization, Technology Transfer and Intellectual Property Protection	Principles and tools of technology transfer and intellectual property protection in bringing R&D outcomes into economic practice. IP instruments (patents, designs, trademarks, copyright, trade secrets), invention disclosure procedures, and the basics of prior-art analysis and legal risk assessment. Industry collaboration models, licensing, and key contract and negotiation aspects in R&D projects.			x			x	x	
18	Cost Accounting for Enterprises	Costs and cost objects and their classification. The essence of cost accounting. The role of traditional and modern cost accounting systems in various areas of enterprise operation.			x		x			x
19	Interdisciplinary Project	A complex, team project combining knowledge from various areas thematically related to the field of study on a given topic, with not all input data known.	x			x	x	x		
20	Diploma Seminar	Certification process and requirements for diploma theses (substantive and editorial); presentation of the assumptions, literature analysis with critical evaluation, and the results of the diploma work. A competency examination is administered as part of the course.				x	x		x	
21	Final Project	Implementing appropriate research methodology: reviewing the literature and formulating hypotheses or specific work objectives. Identifying specific tasks. Selecting methods and tools appropriate to solve the problem, whether for experimental or design work. Analyzing the obtained results. Describing the results. Detailed content depends on the selected work topic.		x		x	x		x	

No.	Course name	Program content	2PIP1	2PIP2	2PIP3	2PIP4	2PIP5	2PIP6	2PIP7	2PIP8
22	Using AI in Project Management	Principles of project planning, organization and implementation in the paper and printing industries. Methods for managing project scope, time, costs, and risk, including support from selected artificial intelligence-based tools.		x				x		
23	Applications of Artificial Intelligence in Papermaking and Printing	A review of artificial intelligence applications in the technological and organizational processes of papermaking and printing. Methods for using AI to analyze process data, control quality, production optimization, and supporting technical and management decisions.	x	x						

ECTS - subjects

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
1	Control, Optimization and Production Management Systems	4				
2	Market Economy	3	3			
3	Managing Industrial Utilities in a Circular Economy	4			4	
4	Advanced Paper and Printing Processes and Materials	6			6	
5	Computer-Aided Design Work	5				
6	Multilayer Materials	3			3	
7	Modern Cellulosic Processes and Materials	5			5	
8	Foreign Language for Specialist Purposes	2		2		
9	Advanced Course on Physics and Chemistry of Paper	3			3	3
10	Operation of Machines and Maintenance of Production Lines	6				
11	Quality Control and Defects of Paper and Printing Products	6			6	
12	Methods of Securing Papers and Prints	4				
13	Printed Electronics	3				3
14	Operating Conditions for Enterprises	3	3			
15	Biorefineries and Bio-based Materials	3		3		
16	Color and its Role in the Marketing of Paper and Printing Products	3		3		
17	Commercialization, Technology Transfer and Intellectual Property Protection	2	2			
18	Cost Accounting for Enterprises	2	2			
19	Interdisciplinary Project	2		2	2	
20	Diploma Seminar	2				

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	Final Project	20		20	20	
22	Using AI in Project Management	2		2		
23	Applications of Artificial Intelligence in Papermaking and Printing	2		2		

ECTS indicators

Name	Value
The total number of ECTS credits that a student must obtain through elective courses (amounting to no less than 30% of the total ECTS credits required to obtain the qualification corresponding to the given level of study)	29/90 (32.22%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	10
The total number of ECTS credits that a student must obtain from courses related to research conducted at the university, amounting to more than 50% of the total ECTS credits required to graduate from a given level of study	49/90 (54.44%)

Methods of verifying and assessing learning outcomes

The assessment of achieved learning outcomes is based on various forms of student assessment, appropriate to the categories of knowledge, skills, and social competences to which they relate. The selection of appropriate tools also depends on the specific nature of the subject and the format of courses and is described in each individual course card. Achievement of the required learning outcomes is assessed through:

1. written assignments (exams, tests, reports, essays, projects, posters, thesis, etc.),
2. oral presentations (oral knowledge tests, discussions, public speaking, e.g., presentations, etc.),
3. practical and/or project tasks (team and individual),
4. observation and assessment of student activity during classes,
5. self-assessment and peer assessment of students (especially in the case of team projects),
6. competency examination and diploma examination.

Assessment can be formative (partial, repeated throughout the course) and/or summative (final grade). The final verification result is given on the currently applicable grading scale.

Professional internships

not applicable

Characteristics of the course

Graduate profile

Graduates of the master’s program in Papermaking and Printing are specialists prepared to work (including managerial positions) in the pulp, paper, printing, paper processing, and related industries. They are capable of solving advanced problems related to pulp and fiber technology, paper production and finishing, corrugated cardboard and paper packaging manufacturing as well as printing technology. They possess practical skills in testing and evaluating the quality of paper, printing, and paper packaging materials. They are able to use specialized computer software as well as AI tools. They are familiar with the basics of control and management systems for production lines and enterprises, understand the contemporary mechanisms of the functioning and development of the market economy, and the principles of the circular economy and digital transformation. They possess knowledge in the areas of management, commercialization of experimental results, and intellectual property protection. Equipped with scientific and technical English language skills, they are prepared to work in industry, research centres, design offices, government, and education (after completing the teaching specialization).

The relationship between the field of study and the university's strategy

The mission of Lodz University of Technology for 2025-2030 is to build a sustainable research university with a strong academic community, ensuring freedom of research and discussion, and modern education, fostering local and global collaboration and innovation for the good of society, the economy, and the world. In terms of the educational process, the University focuses on infrastructure development, continuous modernization of the educational process through staff development, developing a model for undergraduate and doctoral education that prepares graduates for the dynamically changing needs of the socio-economic environment, and creating the best possible study conditions. The master’s degree program in “Paper and Printing” pursues the following objectives:

– Has been created in response to the growing demand in the labor market for specialists in the rapidly developing pulp and paper, paper processing, and printing industries, as well as related sectors,

– the program has been developed with input from the industrial community; in particular, greater emphasis was placed on content related to contemporary economic realities, business management, and collaboration within research teams,

– it introduces modern curriculum content tailored to the needs of employers,

– it emphasizes the acquisition of practical skills,

– it introduces modern teaching methods based on Problem-Based Learning, Flipped Education, e-learning, the use of specialized CAD software, computer simulators, and methods utilizing artificial intelligence,

– it emphasizes the need to enhance the competencies of academic faculty in modern teaching methods, current state-of-the-art knowledge, and technological development.

The new curriculum is going to be delivered using modern and unique teaching infrastructure, which will facilitate the acquisition of practical skills. The “Paper and Printing” program is unique and is offered at only two Polish universities: the Lodz University of Technology and the Warsaw University of Technology. In practice, knowledge and skills related to the paper industry are taught exclusively at the Lodz University of Technology.

Educational objectives and employment and continuing education opportunities

The aim of the program is to provide extensive technical knowledge (both theoretical and practical) regarding the properties of cellulose-based fibrous materials, as well as the characteristics and defects of paper and printing products and materials; the principles of sustainable use of raw materials and biomass processing (biorefineries); as well as providing knowledge of economics, principles of management in a market economy, and intellectual property protection. The curriculum prepares specialists for work (including in managerial positions) in the rapidly evolving and changing industries of: the pulp and paper industry, the printing industry, and paper processing (including packaging), as well as in scientific and industry-specific laboratories, design offices, and for running own businesses, providing services, and performing administrative tasks within these sectors.

Description of the process and outcome of consultations on the proposed study program with the socio-economic environment

The consultation on the proposed study program with the socio-economic environment was conducted by obtaining the opinion of the Business Council.

Description of competencies expected from a candidate applying for admission to studies

A candidate applying for admission to the studies should hold an engineering diploma, bachelor's degree, master's degree, master of engineering degree, or equivalent.

The unit organizing education

Faculty of Organization and Management

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Control, Optimization and Production Management Systems	Laboratory classes: 10 Project work: 15 E-learning: 15	4	Graded assignment	Obligatory
Market Economy	Tutorials: 10 Project work: 10 Lecture: 10	3	Graded assignment	Obligatory
Managing Industrial Utilities in a Circular Economy	Tutorials: 20 Laboratory classes: 10 Project work: 5 Lecture: 20	4	Graded assignment	Obligatory
Advanced Paper and Printing Processes and Materials	Tutorials: 5 Laboratory classes: 25 Project work: 10 Lecture: 30	6	Exam	Obligatory
Computer-Aided Design Work	Laboratory classes: 45 Project work: 20	5	Graded assignment	Obligatory
Multilayer Materials	Tutorials: 8 Laboratory classes: 12 Lecture: 10	3	Graded assignment	Obligatory
Modern Cellulosic Processes and Materials	Laboratory classes: 25 Project work: 10 Lecture: 20	5	Graded assignment	Obligatory
Sum	**345**	**30**		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Foreign Language for Specialist Purposes	Tutorials: 45	2	Graded assignment	Obligatory subjects to choose from
Advanced Course on Physics and Chemistry of Paper	Tutorials: 10 Seminar: 5 Laboratory classes: 10 Lecture: 6	3	Graded assignment	Obligatory
Operation of Machines and Maintenance of Production Lines	Seminar: 8 Laboratory classes: 6 Project work: 26 Lecture: 30	6	Exam	Obligatory
Quality Control and Defects of Paper and Printing Products	Seminar: 10 Laboratory classes: 30 Lecture: 20	6	Graded assignment	Obligatory
Methods of Securing Papers and Prints	Seminar: 8 Laboratory classes: 16 Lecture: 14	4	Graded assignment	Obligatory
Printed Electronics	Seminar: 6 Laboratory classes: 6 Lecture: 18	3	Graded assignment	Obligatory
Operating Conditions for Enterprises	Tutorials: 10 Seminar: 5 Project work: 5 Lecture: 10	3	Graded assignment	Obligatory
Elective Courses 1		3	Graded assignment	Obligatory group
The student chooses 1 course from the group				
Biorefineries and Bio-based Materials	Laboratory classes: 10 Lecture: 16	3	Graded assignment	Optional
Color and its Role in the Marketing of Paper and Printing Products	Seminar: 6 Laboratory classes: 10 Lecture: 10	3	Graded assignment	Optional
Sum	**330**	**30**		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Commercialization, Technology Transfer and Intellectual Property Protection	Seminar: 15 Project work: 15	2	Graded assignment	Obligatory
Cost Accounting for Enterprises	Tutorials: 20 Lecture: 10	2	Graded assignment	Obligatory
Interdisciplinary Project	Project work: 20	2	Graded assignment	Obligatory subjects to choose from
Diploma Seminar	Seminar: 10	2	Graded assignment + exam	Obligatory
Final Project	Diploma Thesis: 0	20	Pass	Obligatory subjects to choose from
Elective Courses 2		2	Graded assignment	Obligatory group
The student chooses 1 course from the group				
Using AI in Project Management	Project work: 20 E-learning: 5	2	Graded assignment	Optional
Applications of Artificial Intelligence in Papermaking and Printing	Project work: 20 E-learning: 5	2	Graded assignment	Optional
Sum	**115**	**30**		