Lodz University of Technology

Study programme

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

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Basic information

Name of the field of study:	Paper and Printing Technology
Level of study:	first-cycle programme (inżynier)
Study profile:	general academic
Form of studies:	part-time studies
Duration of studies (number of semesters):	7
The number of ECTS points required to complete studies:	210
Total number of hours of classes:	1270
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:	51
Professional title awarded to graduates:	inżynier
ISCED code:	0722
Language of study:	polish

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

Discipline	Percentage share
Chemical engineering	52%
Mechanical engineering	24%
Material Engineering	24%

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	**1PIP1**	Has advanced knowledge of basic technical sciences, necessary from the engineer's point of view to explain complex phenomena, processes and principles of operation of devices used in papermaking and printing.	P6U_W	P6S_WG
2	**1PIP2**	Knows and understands contemporary technical, economic and ecological problems in papermaking and printing.	P6U_W	P6S_WK, P6S_WK_inż
3	**1PIP3**	Has detailed knowledge of materials science, machine science and paper and printing technology, including chemical and mechanical processes and control and measurement methods.	P6U_W	P6S_WG, P6S_WG_inż
4	**1PIP4**	Is able to solve complex and non-standard engineering tasks, perform computer calculations and simulations, consciously use advanced IT techniques and tools, develop and critically analyze data in the field of papermaking and printing.	P6U_U	P6S_UW, P6S_UW_inż
5	**1PIP5**	Is able to design processes, select materials and plan research methods in accordance with the given specification, design and manufacture paper and printing products using CAD/CAM tools, with respect to principles and minimizing environmental hazards.	P6U_U	P6S_UW, P6S_UO, P6S_UW_inż
6	**1PIP6**	Is able to use various sources and forms of communication in Polish and a foreign language at B2 level, including using specialist terminology in the field of papermaking and printing, creating documentation, formulating opinions, communicating with specialists from the paper and printing industry and improving his/her professional and personal competences.	P6U_U	P6S_UW, P6S_UK, P6S_UU
7	**1PIP7**	Uses experience gained in industry to collaborate with others in solving technological problems and conducting paper and printing processes.	P6U_U	P6S_UK, P6S_UW_inż
8	**1PIP8**	Uses knowledge from engineering, social sciences, and humanities fields and collaborates with others to develop and present results, and presents them as part of a team effort.	P6U_U, P6U_K	P6S_UO, P6S_KK
9	**1PIP9**	Is prepared to work in a team, create the working environment based on cooperation and integration, and adhere to the principles of professional ethics.	P6U_K	P6S_KK, P6S_KO, P6S_KR
10	**1PIP10**	Is ready to critically evaluate his or her knowledge and the content he or she receives, as well as to seek expert opinions.	P6U_K	P6S_KR

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

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
1	Mathematics I	Number sequences, properties of functions, basic theorems of differential calculus and its application to the study of the variation of functions, the integral, methods of integration, basic theorems of integral calculus, geometric and physical applications of integrals.	x			x						
2	Basics of Preparing Technical Documentation	Basics concept of descriptive geometry and technical machine drawing. Principles of projection in technical drawing, creation of cross-sections of a rotating element and the interpenetration of solids in machine element drawings. Creation of executive drawings of simple and complex machine elements.						x				
3	Chemistry	Basic chemical laws and defnitions, structure of the atom, the periodic table, properties of elements, types of chemical reactions, electrolytic dissociation, the concept of pH.	x			x						
4	Physics	Hydromechanics, thermodynamics, physics og gases. Electrical and magnetic properties of matter. Scientific basis of knowledge of climate change. Optics.	x			x						
5	Introduction to Papermaking and Printing	Development of paper and printing processes. Technical terminology. Classification of paper and printing products. Paper and printing technologies and machines.		x				x				
6	Materials in Engineering Applications	Properties of the basic engineering materials and their application in papermaking; Relationships between complex loading and structure geometry and the stresses and strains for isotropic materials; Selection of materials in an engineering application.			x	x						
7	Structure and Properties of Plant-Based Papermaking Raw Materials	Types of plant paper raw materials and their properties. Types and defects of wood used for papermaking purposes; properties of wood; anatomical structure of the tree trunk; microscopic structure of wood (types of cells); possibilities of using non-wood paper raw materials in papermaking.			x	x		x				
8	English n. B2 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
9	English n. B2+ module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
10	English n. C1 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
11	Mathematics II	Differential calculus, basic concepts and theorems of ordinary differential equations.	x			x						

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
12	Organic Chemistry in Cellulose and Paper Technology	Basic concepts of organic chemistry and polymers. Groups of organic compounds, rules for naming compounds, basic chemical reactions, introduction to the chemistry of sugars and proteins. Mechanisms of polymerization reactions, groups of synthetic polymers. Application of polymers in papermaking.	x			x						
13	Technology of Papermaking Fibrous Pulps	Manufacturing and bleaching technologies of various types of primary paper fibrous pulps. Preparation of fibrous raw materials for processing into paper making pulps. Technological calculations.			x	x						
14	Information Technologies I	The principle of operation of a modern computer and the task processing environment. Local and access networks and the basics of the Internet. Basics of Internet services. Cybersecurity in information technology. Basic information on personal data protection.	x			x						
15	Standardized Methods of Testing Pulps and Paper	Methods of assessing the most important properties of primary pulps. Basic groups of functional properties of paper products and experimental methods for assessing selected properties of these products. Methodology of determining these properties and the operation of devices intended for carrying out these determinations.			x	x		x				
16	Machines and Equipment for Stock Preparation	Construction and operating principles of machines for preparing wood raw materials and devices for producing paper making pulps. Engineering calculations regarding the machine construction.			x	x	x					
17	English n. B2 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
18	English n. B2+ module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
19	English n. C1 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
20	Basics of Process Engineering	Basic unit operations in industrial processes; Basic laws and concepts related to fluid mechanics, heat and mass transfer.	x		x		x					
21	Information Technologies II	Introduction to algorithms, basics of programming, numerical calculations of engineering problems using own programs.	x			x						
22	Machines and Equipment for Paper Production	Construction and operating principle of paper machines. Development trends in the construction of paper machines. Calculation of engineering tasks related to devices used in the wet and drying section of the machine.			x	x	x					
23	Physico-Chemical Principles of Papermaking Processes	Introduction to physicochemical phenomena in papermaking processes. Chemical thermodynamics, reaction equilibrium, theory of multiphase systems, elements of electrochemistry and surface phenomena. Physicochemical foundations of using chemical mass and auxiliary additives in papermaking.	x									

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
24	Power Engineering and Machine Drives	Energy issues in papermaking and printing. Steam-condensate systems and energy-saving solutions in paper machines. Drive systems in paper and printing machines. Hydraulic and pneumatic drives and their application in papermaking and printing.			x	x						
25	Paper Technology	Basic unit operations used in the processes of primary and secondary fibrous raw materials preparation; Principles of paper production in a paper machine; Chemical additives and their influence on the paper properties; Basic technological calculations; Principles and calculations regarding the design of water-mass systems of a paper mills.			x	x	x	x				
26	Measuring Equipment and Industrial Fittings	Vacuum systems, compressed air systems, oil systems, and systems for cleaning and conditioning machine clothes in a paper machine. Measuring equipment, including equipment for measuring process parameters in paper production. Implementation of experimental work aimed at determining key process parameters in the discussed systems.			x		x					
27	English n.B2 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
28	Design of Equipment and Installations in the Paper Industry	Principles of designing machines and devices. Computeer aided design of papermaking machines and installations. Introduction to computer aided manufacturing.			x	x						
29	Biocomposites	Methods of cellulose, lignin and hemicellulose extraction and their application in the production of biocomposites based on natural or synthetic polymers and their properties. Biodegradation, biodecompositon and recycling.		x	x	x	x					
30	English n. B2+ module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
31	Chemical Components of Wood: Structure, Properties, and Application	Distribution of chemical components in wood, their functions, physical and chemical structure. Properties of these components, their reactions in the processes of pulping, oxygen delignification and bleaching. Using these components to produce innovative industrial products.	x			x		x				
32	English n. C1 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
33	Printing Technology	Preparation of publications for printing; printing technologies; production processes and planning of printing production. Design of technological line for selected printing products.			x	x	x					

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
34	DTP and Computer Graphics	Principles of correct preparation of works for printing. Processing of raster and vector graphics and creation of publications using specialist software. Design of selected printing products. Checking their correctness, correcting errors and generating files ready for printing.			x		x					
35	Paper Finishing and Converting	Machines and equipment for paper finishing and converting, as well as technologies for the special papers manufacturing. Methods for measuring selected properties of paper products and raw materials used for paper refining. Basic calculations used in the design of paper converting machines.			x		x					
36	Statistics, Optimization and Artificial Intelligence Elements	Statistical data processing; Statistical hypothesis testing; Regression and trend prediction; Methods of data preparation for analysis and optimization; Principles of creating mathematical models for optimization; Linear programming; Big Data; Introduction to machine learning; Applications of AI methods to the analysis and prediction of data; AI in the control and design.	x		x	x						
37	Company Visits	Study visits in production plants thematically related to the field of "Papermaking and Printing".								x	x	
38	Packaging Printing Processes	Types of paper and non-paper packaging and materials used for their production. Printing techniques and machines. Identification of causes of defects in the printing process and methods of their elimination.			x	x						
39	English n. B2+ module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
40	Printing Plates	Classification of printing plates. Basic parameters of printing plates. Technological processes of making printing plates for various classical printing techniques. Assessment of the quality of printing plates.			x	x		x				
41	Post-Press Machines and Technology	Bookbinding and finishing processes. Machines used in bookbinding and finishing processes. Prints embellishment processes.			x		x					
42	English n. C1 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
43	Production Systems in the Printing Industry	Production process flow and workflow monitoring. Preparation of electronic materials for production processes, process mapping, automation and construction of dedicated process paths in selected Prepress workflow systems.			x		x					
44	English n. B2 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.						x				
45	Printing Machines	Classification and construction of printing machines; construction of basic printing units of printing machines. Conducting and analyzing the printing processes.			x		x					

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
46	Basics of Mechanical Engineering and Design	Basics of machine design. Static strength, durability of moving elements. Gears. Preparation of technical documentation for printing. Methodology of planning the technological process of machining in CAD/CAM systems.			x	x	x					
47	Selected Issues in Paper and Printing Technology	Development of a selected issue in the field of papermaking and printing based on English-language literature in the form of a short scientific publication.						x		x		
48	Manufacture of Corrugated Board and Packaging	Machines, devices and technologies used in the production of corrugated board and packaging. Tests on selected properties of corrugated board and packaging. Principles of packaging design. Manufacturing methods and the use of packaging materials. Functional and environmental properties of the manufactured packaging.			x	x	x					
49	Microeconomics and Management	Economic categories economic laws and theories, economic models. Market categories: demand, supply, price; relationships between them. Fundamentals of enterprise theory. Enterprise as an economic entity - types of enterprises. Objectives of enterprise activity. Analysis of costs, margins of the enterprise. Equilibrium of the enterprise. Models of competition. Alternative theories of enterprises. Labor market, payment.		x								
50	Summative Module	Group project implemented using case teaching and problem-based learning (PBL) methods. Solving practical problems combined with analysis and decision-making in the context of real challenges.			x		x	x		x		
51	Materials and Products of the Paper and Printing Industry	Types of materials used in the paper and printing industry, their properties and applications in the printing process. Classification of paper materials, printing inks and varnishes. Selection of appropriate materials for a specific type of printing.			x	x		x				
52	Selected Issues in Paper Physics	Structure properties of paper; Dimensional stability; Tensile energy absorption and bursting energy absorption; Creep and stress relaxation; Imbibition and optical properties of paper.			x	x	x					
53	Development Trends in Papermaking and Printing Industry	Development prospects for the paper and printing industry. Modernization and optimization of paper and printing processes. Implementation of modern solutions that contribute to improved efficiency and environmental protection.			x			x		x		
54	Environmental Protection and Life Cycle Analysis of Paper and Printing Products	Environmental protection in the paper and printing industry. Pollution parameters and their removal. Waste management and legal aspects of environmental protection. Life cycle assessment of paper and printing products. Definition and principles of preparing environmental documentation.		x	x	x						
55	Tissue Paper Production Processes	Types and properties of tissue papers; Unit operations in the production of tissue papers; Construction and operating principle of paper machines for the production of tissue papers.			x	x						
56	Normalisation and Standardization in Printing	Principles and methods of quality control of basic quality parameters of prints. Control and measurement devices. Standardization of the printing processes. Production quality management. Selection of appropriate tools and measurement methods.			x	x			x			

No.	Course name	Program content	1PIP1	1PIP2	1PIP3	1PIP4	1PIP5	1PIP6	1PIP7	1PIP8	1PIP9	1PIP10
57	Digital Printing Processes	Classification of digital printing techniques. Electrophotographic, ink-jet and thermographic digital printing processes. Toners and inks used in digital printing processes. Applications of digital printing.			x		x	x				
58	Automation of Paper and Printing Processes	Types of control systems. Controllers and their functional properties. Physical quantities used in process control. Control systems used in pulp, paper and printing processes. Simulations of paper machine control systems.			x		x					
59	Elective Project	Designing 3D models, preparing them for production in 3D additive printing, using CNC machining or cutting. Creating a physical model using 3D prototyping techniques and preparing technical documentation of the model in the form of technical drawings.					x	x	x			x
60	Protection of Intellectual Property - Law and Ethics in Business	The importance of intellectual property protection in international, European and domestic law. Selected issues of industrial property protection in Poland. Basic principles of the patent system. Basic principles of drafting a patent description. Introduction to searches in patent databases.								x	x	
61	Internship	To apply the theoretical knowledge learned at the university and develop skills needed in the work market. Getting to know the specifics of work in the industry and gain practical work experience.			x			x	x		x	
62	Diploma Seminar	The diploma procedure and requirements for diploma thesis (content and editorial). Presentation of assumptions, literature analysis and partial results of the diploma thesis.						x	x	x	x	x
63	Engineering Diploma Thesis	A subject devoted to the implementation of an engineering diploma thesis; experimental or engineering design.					x	x				x
64	Failures and Safety in the Pulp and Paper Industry	Basic principles of health safety and requirements for the safety of machines and devices. Potential causes of machine and device failures in the pulp and paper industry and methods of preventing them. Designing systems that increase work safety.			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	Mathematics I	8				
2	Basics of Preparing Technical Documentation	3				
3	Chemistry	4				
4	Physics	4				
5	Introduction to Papermaking and Printing	3			3	
6	Materials in Engineering Applications	4			4	
7	Structure and Properties of Plant-Based Papermaking Raw Materials	4			4	
8	English n. B2 module I	2		2		
9	English n. B2+ module I	2		2		
10	English n. C1 module I	2		2		
11	Mathematics II	6				
12	Organic Chemistry in Cellulose and Paper Technology	5			5	
13	Technology of Papermaking Fibrous Pulps	4			4	
14	Information Technologies I	3				
15	Standardized Methods of Testing Pulps and Paper	5			5	
16	Machines and Equipment for Stock Preparation	5			5	
17	English n. B2 module II	2		2		
18	English n. B2+ module II	2		2		
19	English n. C1 module II	2		2		
20	Basics of Process Engineering	6			6	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	Information Technologies II	3				
22	Machines and Equipment for Paper Production	3			3	
23	Physico-Chemical Principles of Papermaking Processes	6			6	
24	Power Engineering and Machine Drives	3				
25	Paper Technology	7			7	
26	Measuring Equipment and Industrial Fittings	4			4	
27	English n.B2 module III	2		2		
28	Design of Equipment and Installations in the Paper Industry	4			4	
29	Biocomposites	4			4	
30	English n. B2+ module III	2		2		
31	Chemical Components of Wood: Structure, Properties, and Application	4			4	
32	English n. C1 module III	2		2		
33	Printing Technology	5			5	
34	DTP and Computer Graphics	5		5		
35	Paper Finishing and Converting	5			5	
36	Statistics, Optimization and Artificial Intelligence Elements	4			4	
37	Company Visits	1				
38	Packaging Printing Processes	4			4	
39	English n. B2+ module IV	3		3		
40	Printing Plates	4			4	
41	Post-Press Machines and Technology	4			4	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
42	English n. C1 module IV	3		3		
43	Production Systems in the Printing Industry	4			4	
44	English n. B2 module IV	3		3		
45	Printing Machines	4			4	
46	Basics of Mechanical Engineering and Design	5				
47	Selected Issues in Paper and Printing Technology	3		3	3	3
48	Manufacture of Corrugated Board and Packaging	5			5	
49	Microeconomics and Management	2	2			
50	Summative Module	7		7	7	
51	Materials and Products of the Paper and Printing Industry	5			5	
52	Selected Issues in Paper Physics	3			3	3
53	Development Trends in Papermaking and Printing Industry	3			3	3
54	Environmental Protection and Life Cycle Analysis of Paper and Printing Products	3			3	
55	Tissue Paper Production Processes	5			5	
56	Normalisation and Standardization in Printing	5			5	
57	Digital Printing Processes	4			4	
58	Automation of Paper and Printing Processes	3			3	
59	Elective Project	2		2	2	
60	Protection of Intellectual Property - Law and Ethics in Business	3	3			
61	Internship	6				
62	Diploma Seminar	2			2	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
63	Engineering Diploma Thesis	15		15	15	
64	Failures and Safety in the Pulp and Paper Industry	2			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)	65/210 (30.95%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	5
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	145/210 (69.05%)

Methods of verifying and assessing learning outcomes

Verification of the achieved learning outcomes requires the application of diverse forms of student assessment, appropriate to the categories of knowledge, skills, and social competences to which these outcomes relate. The selection of appropriate tools depends on the specifics of the course and the form of instruction, and is specified in the syllabi of individual courses. The achievement of the required learning outcomes is verified through:

1. written assignments (exams, quizzes, reports, essays, projects, posters, thesis, etc.);
2. oral responses (oral knowledge tests, public speaking assignments such as delivering a paper, presentation, etc.);
3. practical and/or project-based tasks (team-based or individual);
4. observation and assessment of student activity during classes;
5. self-assessment and peer assessment (especially in the case of group projects);
6. a competency exam and a diploma examination.

Verification may be formative (conducted partially and repeatedly during the course) and/or summative (final assessment). The final result of the verification is expressed using the currently applicable grading scale.
The course coordinator or instructor is obliged, during the first class, to discuss the course syllabus and to define and formally communicate to students the methods of verification and the conditions under which learning outcomes will be assessed.

Professional internships

Duration: 6 weeks

ECTS credits awarded: 6

The internship is implemented in accordance with the curriculum, in a manner tailored to the profile and specific characteristics of the study program, and in accordance with the rules defined by the Faculty and the University.

Characteristics of the course

Graduate profile

A graduate of the Papermaking and Printing is an engineer prepared to solve problems in the field of cellulose pulp technology, paper production and finishing technology, corrugated board and paper packaging production, and printing technology. He/she has knowledge in the field of construction and operation of machines and devices used in these industries. He/she knows the types and properties of paper materials and prints and methods for testing their quality. He has skills in digital competences, including the use of specialized CAD and CAM programs, as well as AI tools. He/she knows the basics of industrial automation, modern mechanisms of economic development, circular economy and digital transformation. He/she can also assess the life cycle of products in the paper, processing and printing industries. He/she has knowledge in the field of management principles, law, economics and occupational safety, as well as in the field of exact sciences and engineering. He/she is prepared to work in industry, research centers, design offices, administration 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 the years 2025-2030 is to build a sustainable research university with a strong academic community, ensuring freedom of research and discussion and modern education, developing local and global cooperation, innovations for the good of society, economy and the world. In terms of the educational process, the University focuses on, among others, the development of infrastructure, continuous modernization of the educational process through employee development, development of a model of education for students and doctoral students preparing graduates for the dynamically changing needs of the socio-economic environment and creating the best conditions for studying. The "Papermaking and Printing" study program implements the above objectives, i.e.:

- it was created in response to the growing demand of the labor market for specialists in the dynamically developing industries: pulp and paper, paper processing and printing, as well as related industries,
- the program was created with the participation of opinions and comments from the industrial community,
- it introduces modern program content that meets the needs of employers,
- it introduces modern teaching methods based on Problem Base Learning, Flipped Education, e-learning, the use of specialized CAD/CAM programs, computer simulators and methods based on artificial intelligence,
- it introduces the need to raise the competences of academic teachers in the field of modern teaching methods, the current state of knowledge, technological development.

The modernization of the teaching laboratory infrastructure was also the consequence of the modification of the study program. Thanks to this the emphasis on acquiring practical skills was increased. The "Papermaking and Printing" study program is unique and is implemented only at two Polish universities - Lodz University of Technology is one of them.

The aim of education in the field of "Papermaking and Printing" is to provide extensive technical knowledge (theoretical and practical) in the field of pulp and paper production technology, paper processing and printing, as well as construction, operation and control of machines and devices operating in these industries. In addition, knowledge is also provided in the field of management, law and economics, environmental protection, principles of circular economy and sustainable development. Students acquire practical skills related to the use of modern and specialist IT tools in engineering. They are prepared to conduct experimental research, are able to analyze the obtained results and present them. They are able to lead discussions on industry topics, also in a foreign language. The study program prepares specialists to work in very dynamically developing industries: pulp and paper, processing (including packaging) and printing, as well as in design offices, research and development centers, administrative activities and to run their own business in these industries.

Educational objectives and employment and continuing education opportunities

The aim of education in the field of "Papermaking and Printing" is to provide extensive technical knowledge (theoretical and practical) in the field of pulp and paper production technology, paper processing and printing, as well as construction, operation and control of machines and devices operating in these industries. In addition, knowledge is also provided in the field of management, law and economics, environmental protection, principles of circular economy and sustainable development. Students acquire practical skills related to the use of modern and specialist IT tools in engineering. They are prepared to conduct experimental research, are able to analyze the obtained results and present them. They are able to lead discussions on industry topics, also in a foreign language. The study program prepares specialists to work in very dynamically developing industries: pulp and paper, processing (including packaging) and printing, as well as in design offices, research and development centers, administrative activities and to run their own business in

these industries.

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

The consultation of the proposed study program with the socio-economic environment was carried out on the basis of two surveys (a survey for employers and a survey for students of the last two years of studies (5th and 7th semester)) and an analysis of job offers was carried out. After developing the draft study program, two positive opinions were obtained from members of the Business Council.

The survey addressed to employers entitled "Survey for employers employing students/graduates of the Papermaking and Printing major" was used to survey the opinions of employers on the employed students and graduates of the Papermaking and Printing major (PiP) of the Lodz University of Technology. Comments and remarks in the form of completed surveys were received from 17 companies: Karl Knauer Poland, Mondi Poznań, Metsä Board Polska, Colorbox24 Sp. z o.o., hubergroup Polska Sp. z o.o., Serwach sp. z o.o., Eurobox Polska Sp. z o.o., Graw Sp. z o.o., Welmax Paper Sp. z o.o., Smurfit Kappa Polska Sp. z o.o. (Drezdenko/Konin branch), Smurfit Kappa Polska Sp. z o.o. (Pruszków/Warsaw branch), Stora Enso Poland S.A., ICT Poland sp. z o.o., Sieć Łukasiewicz Łódź Institute of Technology, Werner Kenkel Sp. z o.o., Scorpio Sp. z o.o., MM Kwidzyń Sp. z o.o. The answers provided in the surveys were taken into account when introducing changes to the Papermaking and Printing study program, in order to adapt the skills and competences of students of our major to the needs of the economy and the labor market.

The survey addressed to students was used to obtain opinions on the competences and skills acquired during the studies and comments on expectations regarding the competences acquired and thematic issues covered in the study program.

The analysis of job offers confirmed the interest of the labor market in graduates of Papermaking and Printing, especially in the packaging production sector.

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

Not applicable.

The unit organizing education

Faculty of Organization and Management

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics I	Tutorials: 30 Lecture: 15	8	Graded assignment	Obligatory
Basics of Preparing Technical Documentation	Tutorials: 8 Project work: 4 Lecture: 4	3	Graded assignment	Obligatory
Chemistry	Laboratory classes: 15 Lecture: 15	4	Graded assignment	Obligatory
Physics	Laboratory classes: 15 Lecture: 15	4	Graded assignment	Obligatory
Introduction to Papermaking and Printing	Seminar: 4 Lecture: 10	3	Graded assignment	Obligatory
Materials in Engineering Applications	Tutorials: 10 Laboratory classes: 4 Lecture: 12	4	Graded assignment	Obligatory
Structure and Properties of Plant-Based Papermaking Raw Materials	Laboratory classes: 16 Lecture: 12	4	Exam	Obligatory
Sum	**189**	**30**		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics II	Tutorials: 20 Lecture: 15	6	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Organic Chemistry in Cellulose and Paper Technology	Tutorials: 4 Laboratory classes: 8 Lecture: 15	5	Graded assignment	Obligatory
Technology of Papermaking Fibrous Pulps	Laboratory classes: 12 Project work: 5 Lecture: 10	4	Exam	Obligatory
Information Technologies I	Laboratory classes: 15 E-learning: 10	3	Graded assignment	Obligatory
Standardized Methods of Testing Pulps and Paper	Laboratory classes: 18 Lecture: 14	5	Graded assignment	Obligatory
Machines and Equipment for Stock Preparation	Tutorials: 8 Laboratory classes: 6 Project work: 4 Lecture: 10	5	Graded assignment	Obligatory
Foreign Language n. module 1		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English n. B2 module I	Tutorials: 20	2	Graded assignment	Optional
English n. B2+ module I	Tutorials: 20	2	Graded assignment	Optional
English n. C1 module I	Tutorials: 20	2	Graded assignment	Optional
Sum	**194**	**30**		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Basics of Process Engineering	Tutorials: 6 Laboratory classes: 10 Project work: 6 Lecture: 18	6	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Information Technologies II	Laboratory classes: 15 E-learning: 10	3	Graded assignment	Obligatory
Machines and Equipment for Paper Production	Tutorials: 4 Laboratory classes: 6 Lecture: 10	3	Exam	Obligatory
Physico-Chemical Principles of Papermaking Processes	Tutorials: 6 Laboratory classes: 10 Lecture: 14	6	Graded assignment	Obligatory
Power Engineering and Machine Drives	Tutorials: 6 Laboratory classes: 8 Lecture: 10	3	Graded assignment	Obligatory
Paper Technology	Tutorials: 6 Seminar: 2 Laboratory classes: 10 Project work: 4 Lecture: 18	7	Exam	Obligatory
Foreign Language n. module 2		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English n. B2 module II	Tutorials: 20	2	Graded assignment	Optional
English n. B2+ module II	Tutorials: 20	2	Graded assignment	Optional
English n. C1 module II	Tutorials: 20	2	Graded assignment	Optional
Sum	**199**	**30**		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
Printing Technology	Laboratory classes: 12 Project work: 8 Lecture: 14	5	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
DTP and Computer Graphics	Project work: 38	5	Graded assignment	Obligatory subjects to choose from
Paper Finishing and Converting	Laboratory classes: 18 Lecture: 16	5	Exam	Obligatory
Statistics, Optimization and Artificial Intelligence Elements	Laboratory classes: 20 Project work: 4 Lecture: 8	4	Graded assignment	Obligatory
Company Visits	Seminar: 0	1	Graded assignment	Obligatory
Elective Course Block 1		8	Graded assignment	Obligatory group
The student chooses 1 block.				
Block 1.1		8	Graded assignment	Optional
Measuring Equipment and Industrial Fittings	Laboratory classes: 8 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku
Biocomposites	Laboratory classes: 12 Lecture: 8	4	Graded assignment	Obowiązkowe w bloku
Block 1.2		8	Graded assignment	Optional
Design of Equipment and Installations in the Paper Industry	Laboratory classes: 10 Project work: 2 Lecture: 6	4	Graded assignment	Obowiązkowe w bloku
Chemical Components of Wood: Structure, Properties, and Application	Laboratory classes: 10 Lecture: 10	4	Graded assignment	Obowiązkowe w bloku
Foreign Language n. module 3		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English n.B2 module III	Tutorials: 20	2	Graded assignment	Optional
English n. B2+ module III	Tutorials: 20	2	Graded assignment	Optional
English n. C1 module III	Tutorials: 20	2	Graded assignment	Optional
Sum	**196**	**30**		

Semester 5

Course	Number of hours	ECTS points	Form of verification	Obligatory
Printing Machines	Seminar: 6 Laboratory classes: 8 Lecture: 14	4	Graded assignment	Obligatory
Basics of Mechanical Engineering and Design	Tutorials: 8 Laboratory classes: 22 Project work: 6 Lecture: 12	5	Graded assignment	Obligatory
Selected Issues in Paper and Printing Technology	Project work: 20	3	Graded assignment	Obligatory subjects to choose from
Manufacture of Corrugated Board and Packaging	Laboratory classes: 12 Project work: 10 Lecture: 14	5	Exam	Obligatory
Microeconomics and Management	Lecture: 12	2	Graded assignment	Obligatory
Elective Course Block 2		8	Graded assignment	Obligatory group
The student chooses 1 block.				
Block 2.1		8	Graded assignment	Optional
Packaging Printing Processes	Seminar: 4 Laboratory classes: 6 Lecture: 8	4	Graded assignment	Obowiązkowe w bloku
Post-Press Machines and Technology	Seminar: 4 Project work: 6 Lecture: 8	4	Graded assignment	Obowiązkowe w bloku
Block 2.1		8	Graded assignment	Optional
Printing Plates	Seminar: 2 Laboratory classes: 8 Lecture: 8	4	Graded assignment	Obowiązkowe w bloku

Course	Number of hours	ECTS points	Form of verification	Obligatory
Production Systems in the Printing Industry	Seminar: 2 Laboratory classes: 8 Lecture: 8	4	Graded assignment	Obowiązkowe w bloku
Foreign Language n. module 4		3	Exam	Obligatory group
The student chooses one module from the group.				
English n. B2+ module IV	Tutorials: 20	3	Exam	Optional
English n. C1 module IV	Tutorials: 20	3	Exam	Optional
English n. B2 module IV	Tutorials: 20	3	Exam	Optional
Sum	**200**	**30**		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Summative Module	Project work: 34	7	Graded assignment	Obligatory subjects to choose from
Environmental Protection and Life Cycle Analysis of Paper and Printing Products	Seminar: 4 Laboratory classes: 4 Project work: 4 Lecture: 10	3	Graded assignment	Obligatory
Normalisation and Standardization in Printing	Tutorials: 10 Seminar: 6 Laboratory classes: 14 Lecture: 18	5	Exam	Obligatory
Digital Printing Processes	Seminar: 6 Laboratory classes: 6 Project work: 4 Lecture: 14	4	Graded assignment	Obligatory
Automation of Paper and Printing Processes	Laboratory classes: 12 Lecture: 10	3	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Elective Course Block 2		8	Graded assignment	Obligatory group
The student chooses 1 block.				
Block 3.1		8	Graded assignment	Optional
Materials and Products of the Paper and Printing Industry	Laboratory classes: 14 Lecture: 10	5	Graded assignment	Obowiązkowe w bloku
Selected Issues in Paper Physics	Seminar: 4 Laboratory classes: 4 Lecture: 8	3	Graded assignment	Obowiązkowe w bloku
Block 3.2		8	Graded assignment	Optional
Development Trends in Papermaking and Printing Industry	Seminar: 8 Lecture: 6	3	Graded assignment	Obowiązkowe w bloku
Tissue Paper Production Processes	Laboratory classes: 14 Lecture: 12	5	Graded assignment	Obowiązkowe w bloku
Sum	**196**	**30**		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Elective Project	Project work: 26	2	Graded assignment	Obligatory subjects to choose from
Protection of Intellectual Property - Law and Ethics in Business	Lecture: 14	3	Graded assignment	Obligatory
Internship	Internship: 0	6	Pass	Obligatory
Diploma Seminar	Seminar: 18	2	Graded assignment + exam	Obligatory
Engineering Diploma Thesis	Diploma Thesis: 0	15	Pass	Obligatory subjects to choose from

Course	Number of hours	ECTS points	Form of verification	Obligatory
Failures and Safety in the Pulp and Paper Industry	E-learning: 24	2	Graded assignment	Obligatory
Sum	**82**	**30**		