

## 1. General characteristics of the course programme

<b>Major:</b>	<b>Management and Production Engineering (MaPE)</b>
Level of education (first-cycle studies / second-cycle studies / single-cycle master's studies)	first-cycle studies
Education profile (general-academic / practical)	general-academic
Form of studying (full-time / part-time)	full-time
Indicating the fields of science and scientific disciplines or fields of art and artistic disciplines to which the learning outcomes apply (including the leading discipline), and specifying the percentage share of the ECTS points number for individual disciplines in the number of ECTS points necessary to obtain qualifications corresponding to the level of education	The field of engineering and technical sciences  Discipline: Mechanical Engineering 100% (210 ECTS)
Professional title awarded to graduates	Bachelor in Engineering
Information on the scientific category held by the basic organizational unit of the university	A

## 2. Relationship between the field of study and the mission of the University and its development strategy

The main strategic goals and the mission of the University are set out in the resolution of the UZ Senate of June 30, 2021 regarding the comprehensive development of the Development Strategy of the University of Zielona Góra for the years 2021-2030. According to the resolution, *"The mission of the University of Zielona Góra is to create a knowledge-based society and to shape social capital as a common good conducive to the development of the region, its economy and society: Providing high quality education and preparing qualified staff whose intellectual competences contribute to economic development and building social capital. Preparing citizens who are open to changes, tolerant and functioning in the global world. Conducting scientific research at a high, international level. Cooperation with the socio-economic environment in the area of knowledge transfer, new technologies and the implementation of innovative projects. Expansion of intra-university, inter-university and international cooperation encouraging new solutions. Enriching the culture and strengthening the regional identity of the inhabitants of the Lubuskie Voivodeship. Striving to develop the University as a modern, interdisciplinary and compact University associated with*

*the city of Zielona Góra and contributing to the socio-economic development of the Lubuskie Voivodeship and the state."* Strategic goals were defined in three areas, i.e. education, research and the relations of the University with its external partners. The adopted mission and strategy of the University became the basis for their implementation in individual organizational units and, according to the assumptions, it should foster the growth of innovation and competitiveness of the University, strengthening its position in the area of research and the development in the region and interdisciplinarity of science and research.

The Faculty of Mechanical Engineering and the Institute of Mechanical Engineering (IIM), responsible for the field of Management and Production Engineering (MaPE), implement the concept of education, scientific research, projects and contacts with external stakeholders in accordance with the University's mission and strategy. With regard to education, IIM makes every effort to ensure high quality of education and the implementation of didactic processes as well as their improvement and adaptation to the needs of the labour market. The IIM's modern and constantly modernized research infrastructure is the basis for conducting high-level scientific research by employees carrying out classes in the assessed field, as well as for the inclusion of students in the conducted research processes, which results in scientific publications with students. The result of scientific research are numerous scientific monographs and publications in significant journals and conferences (domestic and foreign) in the field of the scientific discipline of Mechanical Engineering. This has a direct impact on ensuring the up-to-date and high level of education in the field of MaPE. In addition, the extensive experience of the staff in cooperation with the industry and numerous international contacts all contribute to ensuring effective education (including foreign visiting professors in the teaching process, good practices and teaching models are transferred from foreign universities) for the students in the field of Management and Production Engineering, that is in line with the needs of the labor market.

### **3. Competencies expected from the candidate applying for admission to first-cycle studies, second-cycle studies or single-cycle master's studies**

Studies in the field of MaPE can be undertaken by persons who have achieved the required learning outcomes, assumed for general education at the level of completing secondary school and obtaining the matriculation certificate (PQF level 4, in accordance with the Integrated Qualifications System). For candidates for the first-cycle studies, the qualifying procedure is based on the competition of matriculation certificates. Numbers of points, with different weighting factors, are assigned for the following subjects: mathematics, physics, Polish, a modern foreign language and one subject selected from: chemistry, computer science.

### **4. Compliance of the assumed learning outcomes with the needs of the labor market (analysis)**

Cooperation with the socio-economic environment in the field of Management and Production Engineering is based, among others, on the analysis of the current needs of the labour market, cooperation with stakeholders in the educational process as well as the organization and conduct of internships. The cooperation is aimed at the best possible connection of the learning process and its outcomes with the development needs of the region and, above all,

with the needs of employers. Stakeholders have a consultative and advisory voice, and their task is to participate in shaping the concept of education in a given field of study, in particular by indicating the desired skills and competences of graduates in order to improve the curriculum and the educational process. In detail, the employers:

- express their views and assess the levels of competence and learning outcomes achieved by the students of Management and Production Engineering,
- indicate general expectations of the labour market for the graduates of the given field of study, define their own current needs demonstrating them by the requirements expressed in, among others, their job offers.

Students and employees participate in the process of determining the concept of education in a given field of study and have an impact on the creation of study plans and curricula. The individual cooperation with enterprises allows our teachers to collect information on the expected competencies of the graduates. Our students influence the learning process, e.g. through systematic evaluation of their instructors. The Institute of Mechanical Engineering has signed cooperation agreements or letters of intent with many companies, enterprises or plants (dozens of enterprises operating on the local market). Thanks to this cooperation, students have the opportunity to complete internships, learning the specifics of individual companies as well as possible employment opportunities after graduation and further professional development. Developing this cooperation is the fulfillment of students' expectations of adapting education to the needs of the industry. Graduates of Management and Production Engineering have the opportunity to express their opinions as part of the graduates' career monitoring programme.

On the basis of the obtained information, the Programme Council for the MaPE major and the Faculty Education Council carry out an analysis of the compliance of the assumed learning outcomes with the labour market needs.

## **5. Description of methods to verify and evaluate the learning outcomes achieved by the student throughout the education process**

General rules for obtaining credits for subjects, semesters and courses are included in the Regulations of UZ studies. The rules for checking and evaluating the learning outcomes applicable in the field of Management and Production Engineering are described in the cards of individual subjects, about which students are informed during their first classes. Students are also informed about the credit criteria adopted for individual assessment methods. In addition, all subject cards with full information (e.g. requirements, thematic scope, learning methods and outcomes, credit conditions, etc.) are posted on the websites of the Institute of Mechanical Engineering, the Faculty of Mechanical Engineering and the UZ Education Department. The instructors collect documentation to verify the achievement of learning outcomes and to confirm the degree of achievement of the outcomes. Each student has the right to view their work. When verifying the learning outcomes, it is assumed that obtaining a positive grade in the exam or a credit at the end of a given module of classes confirms the achievement of all learning outcomes defined therein.

The applied methods of checking and evaluating the learning outcomes are diverse and take into account the specificity of particular categories of outcomes (knowledge, skills, social competences). Methods of verifying learning outcomes may include: exam; test; the

preparation of: papers, reports or projects and their defense; observation and assessment of practical skills; assessing the student's involvement in the classes, etc. The most commonly used methods of checking knowledge are exams, finals, mid-term tests, oral statements, or presentations. The evaluation of the learning outcomes in terms of skills is usually made on the basis of observation and the assessment of practical skills, carrying out research, preparing reports or projects. The acquisition of social competencies, necessary in research activities, is most often verified on the basis of careful observation of students during their individual and team work as part of the exercises, laboratory classes, team projects or seminars. The outcomes in the field of in-depth knowledge and research skills are also assessed during the diploma thesis and during the diploma examination. The learning outcomes assigned to practices are verified on the basis of a completed practice log, approved by the Plant Practice Managers and their opinions. The log must also be approved by the internship supervisor appointed for the MaPE major. Verification of language skills is carried out using methods such as: oral presentation, written work, observation and assessment of the student's activity in class. A synthetic measure of the assumed learning outcomes for a given field of study is the final grade for studies, the method of which is set out in the Regulations of the UZ Studies. The project, stage and examination works at the assessed levels are written or oral. The subject matter of the works concerns the scope of the teaching content described in individual course cards, where the conditions and criteria for passing are also presented. The subject matter of the internship must be consistent with the Management and Production Engineering major and depends on the specificity of the company in which it is carried out. Diploma theses are carried out in accordance with the Regulations of the Faculty of Mechanical Engineering. The subject of diploma theses should be consistent with the field of study and the selected specialty. The list of topics of diploma theses, proposed by the research and teaching staff and accepted by the authorities of the University and the Institute is placed on notice boards. The diploma thesis can be empirical, project-oriented or mixed (e.g. theoretical and empirical). In the diploma thesis, the student should demonstrate the following abilities:

- use of scientific and technical sources of information within the given topic,
- application of research methods used in the field of engineering and technical sciences and in the discipline of mechanical engineering,
- editing and logical argumentation of the work content,
- drawing correct conclusions,
- mastering the technique of writing papers.

The bachelor thesis should contain a solution to an engineering problem contained in the purpose of the work, using the knowledge acquired during the course and the ability to apply appropriate methods and techniques. The achievement of these outcomes is verified during the diploma examination at the end of the first level of education.

At the Institute of Mechanical Engineering, the learning outcomes achieved by students are documented depending on the verification method:

- oral exams/tests with a list of questions along with a description of the criteria used to obtain a given grade;
- written exams/tests with a description of the assessment criteria;
- other forms (reports, written projects, other individual works, student's presentations) - students' works with a description of the assessment criteria;

- diploma exam - diploma thesis, protocol, reviews;
- practice - practice log, opinion.

University teachers are responsible for storing those documents, except the diploma exam records, which are archived by the student service office (BOS). The documents are stored in paper or electronic form until the end of the full educational cycle.

## **6. Course programme for the specific field of study, profile and level of education, including:**

### *6.1. Description of the assumed learning outcomes with the assignment of the field of study to the fields of science and scientific disciplines or fields of art and artistic disciplines to which the learning outcomes should apply.*

The Management and Production Engineering major has been assigned to the area of education in the field of engineering and technical sciences in the discipline of Mechanical Engineering. The learning outcomes for the general academic field of study were adopted by Resolution No. 514 of the Senate of the University of Zielona Góra of 25 April 2012. The learning outcomes were defined in three categories: knowledge, skills and social competence. Their individual categories include:

- acquisition of knowledge in the field of production engineering, mechanical engineering, production management and economics,
- acquisition of skills in the areas of general skills, basic engineering skills and skills directly related to solving engineering tasks,
- acquisition of social competences, making students aware of the role of education and the social role of the graduate, as well as the importance of cooperation and team-work.

The expected outcomes for the field of study take into account the acquisition of knowledge that allows students to understand selected facts, phenomena, methods and theories in the field of management and production engineering at an advanced level. The tables of the developed learning outcomes with their reference to the outcomes for the area of engineering and technical sciences are included in the appendix to this study. Having completed all subjects in the study programme means that the student has achieved all the learning outcomes for the specific major.

In 62% of all ECTS credits, the course modules are related to the research conducted in the unit, relevant to the assessed field of study. Elective modules account for 34% of the total ECTS credits. The learning outcomes imply the acquisition and improvement of research skills and social competences that allow to continue learning, start a professional career or conduct research activity. The effective learning process in the field of Management and Production Engineering, based on the developed directional learning outcomes, is possible thanks to the experienced and qualified staff. The learning outcomes have been formulated in an understandable way, enabling their verification in the form indicated in the cards of individual subjects.

6.2. Study programme indicators

<b>Indicators concerning the programme of study in the evaluated field, level and profile of education</b>	
The number of ECTS credits necessary to obtain qualifications corresponding to the level of education	210
Number of semesters necessary to obtain qualifications corresponding to the level of education	7
Number of ECTS credits assigned to classes requiring direct participation of university teachers and students	107
The number of ECTS points assigned to the modules of classes related to the conducted scientific research in the fields of science/art appropriate in the assessed field of study, for the student to acquire in-depth knowledge and the ability to conduct scientific research (for a major of a general-academic profile)	132
The number of ECTS points assigned to the modules of classes related to practical vocational preparation aimed at acquiring practical skills and social competences by the student (for fields of study with a practical profile)	not applicable
Number of ECTS points assigned to classes in the field of humanities or social sciences (in the case of fields of study assigned to areas other than humanities or social sciences)	19
The number of ECTS credits assigned to elective courses/modules	72
The number of ECTS credits assigned to internships and the number of hours of internships (when the study programme provides for internships)	6 ECTS credits 160 hours
Number of hours of physical education classes - in the case of full-time first-cycle studies or the single-cycle master's course	60 hours

**Modules of classes related to conducted scientific research in the field of science or art related to a specific field of study and aimed at gaining in-depth knowledge and skills of conducting scientific research by the student**

The name of the class module	Form of classes (number of hours)					Sum	Number of ECTS credits
	W	C	L	P	S		
Business Management and Economics	30	30				<b>60</b>	<b>6</b>
Strength of Materials	15		15	15		<b>45</b>	<b>4</b>
Manufacturing Processes	30		45			<b>75</b>	<b>6</b>
Work Environment Engineering	30	30				<b>60</b>	<b>6</b>
Automation and Robotization of Manufacturing Processes	15		30			<b>45</b>	<b>4</b>
Statistical Methods in Production Processes	15			30		<b>45</b>	<b>5</b>
Operations Research	30			30		<b>60</b>	<b>6</b>
Engineering Cost Estimation	30	30				<b>60</b>	<b>6</b>
1. Programming Techniques 2. Numerical Algorithms	15		30			<b>45</b>	<b>4</b>
Fundamentals of Metrology	30		30			<b>60</b>	<b>5</b>
Engineering Databases Design	15		30			<b>45</b>	<b>4</b>
Production and Services Management	30			30		<b>60</b>	<b>5</b>
Fundamentals of Engineering Design	30	15		30		<b>75</b>	<b>6</b>
Production Data Analysis	15			30		<b>45</b>	<b>3</b>
Quality Management	15			15		<b>30</b>	<b>2</b>
Production Logistics	15			30		<b>45</b>	<b>5</b>
Technological Processes	15		45			<b>60</b>	<b>6</b>
Assembly Processes	15			30		<b>45</b>	<b>3</b>
1. Project Planning and Management 2. Innovation Management	30			30		<b>60</b>	<b>4</b>
IT Systems in Production Management	15		30			<b>45</b>	<b>3</b>
1. Concurrent Engineering 2. Concurrent Design in Production Engineering	15			15		<b>30</b>	<b>2</b>

The name of the class module	Form of classes (number of hours)					Sum	Number of ECTS credits
	W	C	L	P	S		
<i>Elective module - specialty: Production and Service Management</i>							
Fundamentals of Maintenance	15			15		<b>30</b>	<b>2</b>
Computer Aided Engineering Work	30		30			<b>60</b>	<b>5</b>
B.Sc. Seminar II					60	<b>60</b>	<b>3</b>
Fundamentals of Production Scheduling	15			30		<b>45</b>	<b>3</b>
B.Sc. Seminar III					75	<b>75</b>	<b>4</b>
Methods and Tools for Innovation in Enterprises	15			30		<b>45</b>	<b>3</b>
Corporate Restructuring	15			30		<b>45</b>	<b>3</b>
Diploma Thesis							<b>15</b>
<i>Elective module - specialty: Quality Engineering</i>							
Design for Quality	15			15		<b>30</b>	<b>2</b>
B.Sc. Seminar II					60	<b>60</b>	<b>3</b>
Development Trends in Quality Control	15			30		<b>45</b>	<b>2</b>
Producibility and Product Quality	15			30		<b>45</b>	<b>3</b>
Quality Control	30		30			<b>60</b>	<b>3</b>
B.Sc. Seminar III					75	<b>75</b>	<b>4</b>
Computer Aided Production Engineering	15			60		<b>75</b>	<b>5</b>
Diploma Thesis							<b>15</b>
SUM							
Basic stage + Production and Service Management						<b>1455</b>	<b>133</b>
Basic stage + Quality Engineering						<b>1485</b>	<b>132</b>

**General-academic profile** – includes classes related to scientific activity conducted at the university in the discipline or disciplines to which the field of study is assigned, in the amount exceeding 50% ECTS credits, and implies the participation of students in classes preparing for conducting scientific activity or participation in this activity.





Elective course modules							
The name of the class module	Form of classes (number of hours)					Sum	Number of ECTS credits
	W	C	L	P	S		
<i>Elective module - specialty: Quality Engineering</i>							
B.Sc. Seminar I					15	<b>15</b>	<b>1</b>
Design for Quality	15			15		<b>30</b>	<b>2</b>
Technical Quality Assessment of Materials and Products	30		30			<b>60</b>	<b>5</b>
Production Control			30			<b>30</b>	<b>2</b>
B.Sc. Seminar II					60	<b>60</b>	<b>3</b>
Development Trends in Quality Control	15			30		<b>45</b>	<b>2</b>
Producibility and Product Quality	15			30		<b>45</b>	<b>3</b>
Quality Control	30		30			<b>60</b>	<b>3</b>
Vocational Training							<b>6</b>
B.Sc. Seminar III					75	<b>75</b>	<b>4</b>
Computer Aided Production Engineering	15			60		<b>75</b>	<b>5</b>
Quality Management Systems	15			30		<b>45</b>	<b>3</b>
Diploma Thesis							<b>15</b>
<b>SUM</b>						<b>795</b>	<b>72</b>

*The programme of study allows the student to choose classes to which ECTS credits are assigned in the amount of not less than 30% of the number of ECTS credits.*

6.3. *Classes or groups of classes - assigning the learning outcomes and curriculum content to each module, forms and the educational methods to achieve those outcomes, as well as the number of ECTS points (syllabi);*

The description of the curriculum content, forms and methods of teaching individual modules and the learning outcomes assigned to them, as well as the number of ECTS points can be found in generally available subject cards. Access to annually updated course cards is possible from the website of the Institute of Mechanical Engineering, the Faculty of Mechanical Engineering and the UZ Education Department through the university-wide IT system SylabUZ, introduced in the academic year 2015/16.

6.4. *Methods of verifying and evaluating the student's achievement of the assumed learning outcomes;*

A detailed description of the methods of verification and assessment of the learning outcomes is included in point 5 of this study.

#### 6.5. *The plan of study including course modules;*

The plan of studies, taking into account the individual modules of classes, is included in the appendix to this study.

#### 6.6. *The length, rules and form of professional practice (practice for first-cycle fields of study and single-cycle master's studies last 6 months - 720h, and for second-cycle studies - 3 months - 360h. For fields of general academic profile, if the programme of study provides for internships).*

In accordance with the Plans of Studies in the field of Management and Production Engineering, the students are obliged to complete internships. Their general rules are set out in the UZ Regulations of Studies and the Regulations of internships at the Faculty of Mechanical Engineering. Students are required to complete an internship of 160 hours - usually four weeks, 40 hours a week, during the summer holidays (part-time students may complete an internship throughout the academic year). Students are obliged to carry out internships by the end of the sixth semester of their studies. Student internships can be carried out in domestic or foreign centers whose area of activity is related to the field of study. On the websites of the Faculty of Mechanical Engineering and the Institute of Mechanical Engineering, in the appropriate tabs, there is a list of workplaces that have signed a Letter of Intent and that accept students for internships. It is an open list, it includes over 60 companies that have signed declarations of cooperation; this is not, however, a necessary condition, and this list is only a proposal to guide undecided students. Internships can also be carried out under the Erasmus Plus Programme. The aim of the internship is to familiarize the student with the specifics of industrial plants, their organizations and the cooperation of individual departments. In particular, they aim at:

- consolidation of theoretical knowledge acquired during studies by applying them in professional practice;
- familiarization with the production process and the work of technical departments, learning the methods of work organization and technical progress;
- familiarization with the basic provisions of work discipline and the conditions of occupational health and safety;
- arousing and strengthening students' interest in working in a company and learning the requirements for employees;
- creating conditions for self-assessment in a workplace, recognizing real aptitudes and shortcomings;
- collecting observational and experimental material related to the diploma thesis;
- increasing employment opportunities after graduation.

During the internships, students should learn not only the production process, but also the economic and sociological factors that accompany it, which they usually do not encounter during their engineering studies.

In order to complete the internship, it is necessary to submit the following to your supervisor: the internship journal confirmed by the company and the internship evaluation questionnaire completed by the company. Having accomplished the internship, the student completes the internship evaluation survey (the UZ Rector's Ordinance No. 48 of March 4,

2020) via the StudNet system. The analysis of the practice evaluation surveys is part of the learning evaluation report.