COURSE OUTLINE

of the class 2025-2027

Transilvania University of Braşov

Master's degree study programme	ENGINEERING OF ADVANCED MANUFACTURING PROCESSES (ENGLISH)
Fundamental field	Engineering
Master's degree study field	Industrial Engineering
Faculty	Technological Engineering and Industrial Management
Duration of studies	2 years
Form of education:	Full-time (IF)
Type of master's study programme:	professional

1. TRAINING OBJECTIVES AND COMPETENCIES

The general objective of this master's program is to train specialists capable of performing and managing activities in the field of industrial engineering, technologies, and manufacturing processes for products made of plastic and metallic materials, under conditions of technical and economic efficiency. The objective involves the transmission of knowledge related to manufacturing engineering in accordance with current European and global trends, and the acquisition by students of the necessary competencies for the production of material goods, thus ensuring employment within the range of engineering activities in national or multinational companies.

The occupation that can be practiced on the labor market is *Expert Mechanical Engineer*, and the COR/ISCO-08 code registered in RNCIS is **214434**.

The competencies acquired by completing this master's program are partly complementary to those gained during the undergraduate cycle, while others are entirely new. These competencies are intended to shape the profile of a specialist capable of providing services in the field of manufacturing engineering, in line with the needs identified in multinational companies. Thus, these new professional competencies ensure that graduates can obtain jobs both domestically and abroad, in top-tier companies.

Graduates of this master's program are directly oriented toward productive activities, with their professional training also incorporating the practical experience of multinational companies operating in the Brașov area. Additionally, master's students acquire competencies in enterprise management, quality management, and industrial project management. These graduates are also qualified to hold teaching positions and to apply for doctoral studies.

The graduate will possess skills in implementing current techniques and strategies in manufacturing processes. To this end, the educational offer is focused on production-related issues and is flexible through two optional tracks, tailored to the specifics of manufacturing parts from metallic materials and those from plastic materials, in accordance with current industry requirements and trends.

Through the competencies acquired, graduates will be able to work in production across the stages of design, manufacturing, manufacturing management, quality management, and enterprise resource management.

The competency profile developed in accordance with labor market needs and the national qualifications framework, as well as the learning outcomes associated with these competencies, are briefly presented below.

2. COMPETENCIES

Competencies are developed in the following forms:

CP.1 Defines technical requirements

1.1. Knowledge

L.O.1.1.1. The graduate explains the selection of technological process variants.

L.O.1.1.2. The graduate identifies materials, technologies, equipment, and systems used in the manufacturing of metallic products.

L.O.1.1.3. The graduate defines the machinability of industrial products.

L.O.1.1.4. The graduate analyzes the main stages of design for manufacturing.

L.O.1.1.5. The graduate characterizes polymeric materials.

1.2. Skills

L.O.2.1.1. The graduate correctly uses the concept of group technology.

L.O.2.1.2. The graduate explains the mechanism of friction phenomena.

L.O.2.1.3. The graduate characterizes technological processes at an advanced level.

L.O.2.1.4. The graduate applies statistical methods and tools.

1.3. Responsibility and autonomy

L.O.3.1.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.

CP.2 Uses specialized design software

2.1. Knowledge

L.O.2.1.1. The graduate designs the kinematic parameters of manufacturing processes.

2.2. Skills

L.O.2.2.1. The graduate applies fundamental concepts of process capability.

L.O.2.2.2. The graduate applies design principles for plastic or metallic parts.

L.O.2.2.3. The graduate applies working principles in a flexible manufacturing system.

2.3. Responsibility and autonomy

L.O.2.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.

CP.3 Provides and uses technical documentation

3.1. Knowledge

L.O.3.1.1. The graduate develops professional projects and technological documentation for thermoplastic parts manufactured by injection.

L.O.3.1.2. The graduate plans production processes.

3.2. Skills
L.O.3.2.1. The graduate uses ERP software at an advanced level for planning, controlling, and improving organizational processes.
L.O.3.2.2. The graduate identifies processes, flows, principles, methods, and tools of the quality management system.
L.O.3.2.3. The graduate identifies applicability limits and performance parameters of polymeric materials.
L.O.3.2.4. The student/graduate analyzes and synthesizes project progress to apply necessary measures for achieving the proposed objective within a predefined budget, performs cost calculations, and formulates and applies improvement plans.
3.3. Responsibility and autonomy
L.O.3.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.
CP.4 Designs prototypes
4.1. Knowledge
L.O.4.1.1. The graduate selects the plastic injection machine.
L.O.4.1.2. The graduate designs bearings.
L.O.4.1.3. The graduate identifies suitable plastic material for product manufacturing.
4.2. Skills
L.O.4.2.1. The graduate compares various types of additives to improve polymer material properties.
L.O.4.2.2. The graduate analyzes the performance of the quality management system for manufactured parts.
L.O.4.2.3. The graduate measures friction and lubrication parameters of bearings.
L.O.4.2.4. The graduate determines machining process parameters and calculates rolling bearings (design criteria, calculation procedure).
4.3. Responsibility and autonomy
L.O.4.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.
CP.5 Analyzes production processes for improvement
5.1. Knowledge
L.O.5.1.1. The graduate develops specific projects using quality control procedures and tools.
L.O.5.1.2. The graduate creates a Code of Ethics.
L.O.5.1.3. The graduate uses Kanban.
5.2. Skills
L.O.5.2.1. The graduate characterizes decision-making, knowledge management, and information technology.
L.O.5.2.2. The graduate delivers knowledge on Advanced Product Quality Planning (APQP) and control plans.
L.O.5.2.3. The graduate explains the purpose, technology, organizational and strategic impact of ERP systems.
L.O.5.2.4. The graduate applies Shopfloor Management principles.
L.O.5.2.5. The graduate determines ROI.
L.O.5.2.6. The graduate details the characteristics of organizational culture.
5.3. Responsibility and autonomy
L.O.5.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.
CP.6 Controls production
6.1. Knowledge
L.O.6.1.1. The graduate designs the organizational structure.
L.O.6.1.2. The graduate explains working concepts for SAP ERP.
6.2. Skills
L.O.6.2.1. The graduate develops practical SAP ERP applications.
6.3. Responsibility and autonomy
L.O.6.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.
CP.7 Manages engineering projects
7.1. Knowledge
L.O.7.1.1. The graduate manages the phases and tasks of a project.
L.O.7.1.2. The graduate describes the injection molding process.
7.2. Skills
L.O.7.2.1. The graduate correctly uses the concept of product family.
L.O.7.2.2. The graduate applies fundamental concepts of Lean manufacturing.
L.O.7.2.3. The graduate estimates production costs.
7.3. Responsibility and autonomy
L.O.7.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.
CP.8 Monitors quality standards in manufacturing
8.1. Knowledge
L.O.8.1.1. The graduate identifies and describes statistical methods, procedures, and tools for planning, controlling, and improving process quality.
L.O.8.1.2. The graduate demonstrates knowledge of quality tools.
8.2. Skills
L.O.8.2.1. The graduate uses dedicated software for planning, controlling, and improving quality.
8.3. Responsibility and autonomy
L.O.8.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.

CP.9 Ensures project management

9.1. Knowledge

L.O.9.1.1. The graduate identifies and recognizes modern manufacturing technologies specific to various types of parts, as well as related technological equipment.

9.2. Skills

L.O.9.2.1. The graduate efficiently uses linguistic skills, including foreign languages.
L.O.9.2.2. The graduate performs mathematical calculations specific to industrial projects.
L.O.9.2.3. The graduate develops and prepares professional projects specific to industrial engineering.
L.O.9.2.4. The graduate prepares research projects and related documentation in the field of industrial engineering.
L.O.9.2.5. The graduate explains project management methods.

9.3. Responsibility and autonomy

L.O.9.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.

CP.10 Interprets technical requirements

10.1. Knowledge

L.O.10.1.1. The graduate describes and compares the structure of manufacturing equipment and systems.

10.2. Skills

L.O.10.2.1. The graduate selects the type of injection machine for a specific product.
L.O.10.2.2. The graduate calculates the optimal technological process.
L.O.10.2.3. The graduate selects the optimal clamping system.

10.3. Responsibility and autonomy

L.O.10.3.1. The graduate demonstrates autonomy in solving problems specific to industrial products and processes.

Ct.11 Applying the values and ethics of the engineering profession

11.1. Competencies

L.O.11.1.1. The graduate promotes logical, convergent, and divergent reasoning.

Ct.12 Performing activities and exercising roles specific to teamwork at various hierarchical levels

L.O.12.1.1. The graduate continuously improves their own activity.

3. STRUCTURE PER WEEKS OF THE ACADEMIC YEAR

Number of semesters: 4 semesters.
Number of credits per semester: 30 credits
Number of hours of teaching activities /week: 16
Number of weeks: 14/semester

	Teaching activities		Exam sessions			Holidays		
	Sem. I	Sem. II	Winter	Summer	Retakes	Winter	Spring	Summer
Year I	14	14	3	4	2	3	1	10
Year II	14	14	3	3	2	3	1	-

4. PROVISION OF EDUCATION FLEXIBILITY. CONDITIONINGS

The flexibility of the study program is ensured by optional disciplines and facultative disciplines.
The optional disciplines are proposed for the semesters 2-4, through packages of specialized disciplines.

5. CONDITIONS OF ENROLLMENT IN THE FOLLOWING STUDY YEAR. CONDITIONS FOR PASSING A STUDY YEAR

Enrollment in the following year is conditional on meeting the promotion conditions contained in the Regulation on the professional activity of students.

6. CONDITIONS FOR ATTENDING THE FACULTATIVE DISCIPLINES

This Course Outline includes, in addition to the compulsory and at choice (optional) disciplines, several facultative disciplines.

7. REQUIREMENTS FOR OBTAINING THE MASTER'S DEGREE DIPLOMA

The conditions for taking the dissertation exam are presented in the *Methodology for the academic studies final examination*, approved by the Senate of the University. According to this methodology, in order to enter the dissertation exam, all disciplines laid down in the course outline must have been passed.

DISSERTATION EXAM

1 Period of drafting the dissertation: semesters 3 – 4;
2 Period of completing the dissertation: the last 3 weeks of the terminal year;
3. Period of defending the dissertation exam:
4. Number of credits for defending the dissertation: 15 credits.

Transilvania University of Braşov
Faculty of Technological Engineering and Industrial Management
Study Program: Engineering of Advanced Manufacturing Processes (English)
Fundamental Domain: Engineering
Master Program Domain: Industrial Engineering
Study Period: 2 Years
Form of Education: Full Time
Master Program Type: Professional

Ministry of Education and Research
Academic Year 2025-2026

1st YEAR

No	Subject:Compulsory	C_1**	C_2**	1st Semester								2nd Semester							
				C	S	L	P	SI	Pr	V	Cr	C	S	L	P	SI	Pr	V	Cr
1	Advanced Materials	DF	DOB	2	0	2	0	64	0	E	4								
2	Technologies Used for Manufacturing Process	DS	DOB	3	0	2	1	66	0	E	5								
3	Design of Experiments	DF	DOB	2	0	2	0	64	0	E	4								
4	ERP Systems	DF	DOB	2	0	2	0	64	0	E	4								
5	Professional Internship I I**	PS	DOB	0	0	0	7	202	0	V	10								
6	Design for Manufacturing	DS	DOB	1	1	0	0	62	0	C	3								
7	Quality Management in Industry	DS	DOB									2	0	1	2	80	0	E	5
8	Project Management	DS	DOB									2	0	2	0	94	0	E	5
9	Ethics and Academic Integrity	DS	DOB									2	0	1	1	69	0	E	5
10	Professional Internship II**	PS	DOB									0	0	0	10	160	0	V	10
Total				10	1	8	8	522	0	E: 4, C: 1, V: 1	30	6	0	4	13	403	0	E: 3, C: 0, V: 1	25
Total compulsory hours per week				27								23							

No.	Optional Subjects	C_1**	C_2**	I Semester								II Semester							
				C	S	L	P	SI	Pr	V	Cr	C	S	L	P	SI	Pr	V	Cr
4	Polymer Chemistry	DAP	DOP									2	0	2	0	94	0	E	5
4	Design of Bearings	DAP	DOP									2	0	2	0	94	0	E	5
Total				0	0	0	0	0	0	E: 0, C: 0, V: 0	0	2	0	2	0	94	0	E: 1, C: 0, V: 0	5
Total optional hours per week				0								4							

*) Note:
PC proficiency course SC synthesis course AC advanced course
CPC compulsory course EC elective course NCPC non-compulsory course
**) partial assisted activities

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Transilvania University of Braşov **Ministry of Education and Research**
Faculty of Technological Engineering and Industrial Management Academic Year 2026-2027
Study Program: Engineering of Advanced Manufacturing Processes (English)
Fundamental Domain: Engineering
Master Program Domain: Industrial Engineering
Study Period: 2 Years
Form of Education: Full Time
Master Program Type: Professional

2nd YEAR

Nr. crt.	Compulsory subject	C_1**	C_2**	3rd Semester									4th Semester								
				C	S	L	P	SI	Pr	V			Cr	C	S	L	P	SI	Pr	V			Cr
1	Organizational Management	DS	DOB	2	1	1	0	94	0	E			5										
2	Process Management and Improvement	DS	DOB	2	0	2	0	94	0	E			5										
3	Professional Internship III**	PS	DOB	0	0	0	10	160	0	C			10										
4	Integrated Design and Manufacturing of Industrial Products	DS	DOB											2	0	2	0	94	0	C			5
5	Professional Internship IV**	PS	DOB											0	0	0	11	146	0	V			10
6	Development of Master's Thesis	PLD	DOB											0	0	0	12	282	0	V			15
Total				4	1	3	10	348	0	E	C	V	20	2	0	2	23	522	0	E	C	V	30
										2	1	0								0	1	2	
Total compulsory hours per week				18										27									

No	Optional Subjects	C_1**	C_2**	3rd Semester									4th Semester								
				C	S	L	P	SI	Pr	V			Cr	C	S	L	P	SI	Pr	V			Cr
1	Injection Moulding	DCA	DOP	2	0	1	2	194	0	E			5										
1	Advanced Manufacturing Technologies for Bearings	DCA	DOP	2	0	1	2	80	0	E			5										
2	Manufacturing Technologies for Plastic Parts	DCA	DOP	2	0	2	0	94	0	E			5										
2	Production Process Simulation	DCA	DOP	2	0	2	0	94	0	E			5										
Total				4	0	3	2	288	0	E	C	V	10	0	0	0	0	0	0	E	C	V	0
										2	0	0								0	0	0	
Total optional hours per week				9										0									

*) Note:
PC in-depth subject (may be a common core defined at the faculty level) SC synthesis subject
AC advanced knowledge subject DC complementary subject
**) partial assisted activities

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GENERAL BALANCE I

No	Subject	1st Year	2nd Year	Total	Total %	Standard ARACIS
1	Compulsory	700	630	1330	87.96	
2	Optional	56	126	182	12.04	
	Total	756	756	1512	100	

GENERAL BALANCE II

No	Subject	1st Year	2nd Year	Total	Total %	Standard ARACIS
1	Proffesional Internship	238	294	532	35.19	
2	Preparation of disertation	0	168	168	11.11	
3	Fundamental subjects	168	0	168	11.11	
4	Specialisation subjects	294	168	462	30.56	
	Total	756	756	1512	100	

GENERAL BALANCE III

No	Subject	1st Year	2nd Year	Total	Total %	Standard ARACIS
1	Proffesional internship	238	294	532	76	
2	Internship for disertation	0	168	168	24	
	Total	238	462	700	100	

* Excluding partial assisted activities

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