Fakultät für Ingenieurwesen
Facoltà di Ingegneria
Faculty of Engineering

COURSE DESCRIPTION – ACADEMIC YEAR 2024/2025

Course title	**Manufacturing Technology**
Course code	42154
Scientific sector	ING-IND/16
Degree	Bachelor in Industrial and Mechanical Engineering (L-9)
Semester	1
Year	3
Credits	8
Modular	No

Total lecturing hours	48
Total lab hours	30
Attendance	Attendance is not compulsory, but recommended.
Prerequisites	Students should be familiar with the basic knowledges of solid mechanics and mathematical analysis.
Course page	Microsoft Teams and https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "caratterizzanti – ingegneria gestionale". The course aims to provide an overview of the leading manufacturing processes in industrial engineering, including the relationships among the properties of metallic materials, manufacturing processes, and the design of mechanical products. The fundamental principles of manufacturing processes are discussed, also with the intent of providing some concepts about the relationships between these processes and product requirements in terms of performance and cost. The main issues concerning the material behavior of metals, bulk and sheet metalworking, metal machining, metal casting, and welding are discussed in this course. Moreover, fundamentals of surface treatments, common coating practices, nondestructive testing, and their use in the manufacturing field are introduced. During the course, the students will acquire the main theoretical knowledge related to the scientific and technological aspects of interest in the manufacturing industry. In addition, using a project-based learning approach, students solve a real-world problem that requires the use of a CAD/CAM software tool, encouraging critical thinking and the application of theoretical concepts to practical scenarios.

Lecturer	Prof. Walburga Kerschbaumer
Contact	Walburga.kerschbaumer@unibz.it
Scientific sector of lecturer	ING-IND/16
Teaching language	German
Office hours	During the lecture time span, arrange beforehand by email for the available slots: Tuesday h.18-19 and Wednesday h.13-14.
Lecturing Assistant	Thomas Seebacher
Contact LA	thomas.seebacher@schule.suedtirol.it

Office hours LA	Arrange beforehand by email.
List of topics	• Introduction and overview of manufacturing • Fundamentals of materials: their behavior and manufacturing properties • Structure and mechanical behavior of metals • Metal casting processes • Metal forging processes • Metal rolling processes • Metal extrusion processes • Metal drawing processes • Sheet metal forming processes • Machine processes and machine tools • Fusion- and solid-state welding processes • Powder metal processing • Ceramics and Polymers processing • Surface treatments and coatings • Non-destructive testing (NDT)
Teaching format	Frontal lectures, project-based learning, industrial excursion(s). The students can also contact the professor to ask questions and have clarifications about the course topics.

Learning outcomes	Knowledge and understanding: 1. To acquire knowledge and understanding about the main important manufacturing processes. 2. To know and understand the leading manufacturing equipment and machine tools. 3. To understand the relationships between materials, manufacturing processes, and product requirements. 4. To identify the advantages and limitations of the leading industrial manufacturing processes. Applying knowledge and understanding: 5. Operational capacity to solve problems of medium complexity of manufacturing engineering. 6. To evaluate which manufacturing process is more suitable to ensure proper cost and technical product requirements. Making judgments: 7. To critically identify and select the information necessary for the proper selection and planning of a manufacturing process. 8. To examine objectively the results obtained from analytical processing, numerical simulations, or experimental laboratory tests. 9. To develop a predisposition to solve problems of medium complexity related to manufacturing technologies. 10. To make use of technical and scientific literature. Communication skills: 11. to prepare scientific and technical documentation concerning the main manufacturing processes.

12. Ability to present, communicate, discuss, and argue the topics covered in the course.

Learning skills

13. The student will develop learning skills through the individual study of the topics addressed during the lecture and exercise hours. In addition, the analysis of different issues of manufacturing processes may also be addressed by group discussions.
14. The student will have the opportunity to extend the knowledge of the manufacturing processes by consulting scientific literature, specialized texts, and technical and international standards, which the professor may provide during the course.

Assessment

Formative Assessment

The exercises in the classroom and laboratory, as well as discussions with the professor during the lectures would allow to assess and evaluate the students' ability to apply their knowledge and understanding of the topics covered during the course.

Form	Duration	Nr. Learning outc.
Discussions with the professor	Frontal and exercise lectures	2, 10, 12, 13, 14
Class exercises	Exercise lectures	1, 3, 5, 8, 9, 11, 13

Summative Assessment

The whole exam consists of a written exam (max. mark 20/30) and the oral presentation of a team project work (max. mark 10/30).

The written exam consists of 2 or 3 exercises inherent to all the topics covered in the course (both during the frontal and exercise lectures). A minimum mark 10/30 in the written exam is a mandatory requisite to pass the whole exam.

The oral exam consists of theory questions about all the topics covered in the course (both during the frontal and exercise lectures).

Overall, the whole exam is summarized in the following:

Form	Duration	Nr. Learning outc.
Written exam – exercises	2 or 3 exercises (1 or 1.5 hours). The max. mark is 10/30.	3, 5, 9

	Presentation project work	About 30 minutes per group. The max. mark is 10/30	1-4, 6, 7, 12
Assessment language	German		
Assessment Typology	Monocratic		
Evaluation criteria and criteria for awarding marks	The evaluation criterion of the written exam is the correctness of the solution(s) of each exercise. The evaluation criteria for the project work are skills in critical thinking, ability to identify new solutions using the described technologies, ability to work in a team, creativity. The final mark is the sum of the marks obtained in the written and oral project presentation.		

Required readings	The course material is collected from various textbooks, lecture notes, and research papers. The student can mainly refer to the following textbooks: 1) S. Kalpakjian, Manufacturing Engineering and Technology, ed. Pearson 2) M.P. Groover, Fundamentals of Modern Manufacturing, ed. Wiley
Supplementary readings	The professor may provide additional textbooks, lecture notes, research papers, and readings.