Syllabus

Course Description

Course Title	Manufacturing Technology
Course Code	42154
Course Title Additional	
Scientific-Disciplinary Sector	IIND-04/A
Language	German
Degree Course	Bachelor in Industrial and Mechanical Engineering
Other Degree Courses (Loaned)	
Lecturers	Prof. Walburga Ursula Kerschbaumer, Walburga.Kerschbaumer@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/50265
Teaching Assistant	
Semester	First semester
Course Year/s	3
CP	8
Teaching Hours	48
Lab Hours	30
Individual Study Hours	118
Planned Office Hours	24
Contents Summary	The course aims to provide an overview of the leading manufacturing processes in industrial engineering, including the relationships among the properties of materials, manufacturing processes, and the design of mechanical products. - Deformation processes: forging, rolling, drawing, extrusion, sheets metalworking; - Machining operations: ortogonal cutting, cutting forces, tool wear, turning, milling; - Working cycle; - Founduary, casting processes; - Non conventional machining processes: EDM, laser cutting,

	waterjet, additive manufacturing; - Welding processes
Course 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 - Machining processes and tools - Fusion- and solid-state welding processes - Surface treatments and coatings - Non-destructive testing (NDT)
Keywords	Primary Shaping, Forming, Machining, Joining, Process Planning
Recommended Prerequisites	Students should be familiar with the basic knowledges of solid mechanics and mathematical analysis.
Propaedeutic Courses	
Teaching Format	Lecture, exercise, laboratory activities, project work, in person
Mandatory Attendance	Attendance is not compulsory, but recommended.
Specific Educational Objectives and Learning Outcomes	The course of Manufacturing Technology is a core teaching ("caratterizzanti") in the context of the degree in Industrial and Mechanical Engineering. The course consists of 48 hours of frontal lectures and 30 hours of exercises. A part of the lectures will also be involved in the Experiential Learning program of the Faculty with a focus on the development of specific practical projects. 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 an experiential 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. 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 necessary information 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.
Specific Educational Objectives and Learning Outcomes (additional info.)	
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. Discussions with the professor: frontal and exercise lectures; Nr. Learning outcomes.: 2, 10, 12, 13, 14; Class exercises: exercise lectures; Nr. Learning outcomes.: 1, 3, 5, 8, 9, 11, 13. - Summative Assessment: The whole exam consists of a written exam (max. mark 20/30) and the written report and oral presentation of a team project (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 of 10/30 in the written exam is a mandatory requisite to pass the whole exam. Overall, the whole exam is summarized in the following: Written exam, exercises: 2 or 3 exercises (1 or 1.5 hours). The max. mark is 20/30; Nr. Learning outcomes.: 3, 5, 9; Report and presentation project work: About 30 minutes per group. The max. mark is 10/30; Nr. Learning outcomes.: 1-4, 6, 7, 12.
Evaluation Criteria	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, and 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. Pearson2) M.P. Groover, Fundamentals of Modern Manufacturing, ed. Wiley3) A.H. Fritz, Fertigungstechnik 13. Auflage, Springer Vieweg4) B. Awiszus, Grundlagen der Fertigungstechnik, Hanser
Supplementary Readings	The professor may provide additional textbooks, lecture notes, research papers, and readings.
Further Information	
Sustainable Development Goals (SDGs)	Industry, innovation and infrastructure, Quality education