

Manufacturing for Biomedical Components

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♦ Timetable

- Tuesday 10.30-12.30 (Me [Polo didattico di via Gradenigo])
- Wednesday 12.30-14.30 (Ee [Polo didattico di via Gradenigo])

♦ Websites

- for teaching material: <https://elearning.unipd.it/dei/>
- for exams: www.uniweb.unipd.it: January 20st (written) and February 11th (written)

♦ Course modes:

- Classroom lectures
- Classroom exercises
- Laboratory experiences

♦ Exam procedures:

- Written exam including 3-4 theory questions (open or quiz) and 2-3 exercises – two examples are available on Moodle
- Oral exam (optional)

♦ Recommended books:

- S. Kalpakjian, S.R. Schmidt, **Manufacturing Engineering and Technology**, Prentice Hall, 7th Edition, in English
- S. Kalpakjian, S.R. Schmidt, **Tecnologia Meccanica**, Prentice Hall, 2nd Edizione, in Italian
- Lectures notes

Course presentation

♦ Objectives

- to give the fundamentals of the manufacturing technologies with particular reference to those devoted to the production of biomedical components
- to allow evaluating and choosing the most suitable technology on the basis of the product requirements

♦ Relevance

- the manufacturing process choice is strictly connected to the product design (*concurrent engineering*)
- the manufacturing process is very often a critical factor of success for the manufacturing companies
 - production costs and times
 - product quality
 - production system quality

♦ Complexity

- huge number of manufacturing processes
- new technologies, process innovations

Course program

- ***Introduction***
- ***Mechanical behaviour of metallic materials***
- ***Tribology***
- ***Bulk forming processes:***
 - ✓ forging, rolling, extrusion, drawing
- ***Sheet forming processes:***
 - ✓ sheet characteristics, anisotropy
- ***Machining processes:***
 - ✓ mechanics of chip formation
 - ✓ turning, drilling, milling
 - ✓ grinding
 - ✓ unconventional machining processes

- ***Additive Manufacturing***

- ✓ Introduction to Additive Manufacturing
- ✓ Additive Manufacturing of Polymeric Materials
- ✓ Additive Manufacturing of Metallic Materials
- ✓ Additive Manufacturing of Biomedical components