



## ADVANCED APPLIED MECHANICS AND TECHNOLOGY

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|-----------------|---|
| Enrollment year | 2016/2017   |
| Academic year   | 2018/2019   |
| Regulations     | DM270   |
| Department      | DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING |
| Course          | INDUSTRIAL ENGINEERING  |
| Curriculum      | Meccanica   |
| Year of study   | 3°  |
| Period          | 1st semester (01/10/2018 - 18/01/2019)                        |
| ECTS            | 12  |
| Language        | Italian   |

The activity is split

504063 - COMPLEMENTS OF MACHINES MECHANICS

502472 - MECHANICAL TECHNOLOGY



## COMPLEMENTS OF MACHINES MECHANICS

|                     |   |
|---------------------|---|
| Enrollment year     | 2016/2017   |
| Academic year       | 2018/2019   |
| Regulations         | DM270   |
| Academic discipline | ING-IND/13 (APPLIED MECHANICS FOR MACHINERY)  |
| Department          | DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING   |
| Course              | INDUSTRIAL ENGINEERING  |
| Curriculum          | Meccanica   |
| Year of study       | 3°  |
| Period              | 1st semester (01/10/2018 - 18/01/2019)  |
| ECTS                | 6   |
| Lesson hours        | 53 lesson hours   |
| Language            | Italian   |
| Activity type       | WRITTEN AND ORAL TEST   |
| Teacher             | ROTTENBACHER CARLO EUGENIO ALESSANDRO (titolare) - 6 ECTS   |
| Prerequisites       | Suggested: Applied mechanics; Structural mechanics, Numerical analysis  |
| Learning outcomes   | Applied Mechanics module - This course introduces the undergraduate student to the methodologies and techniques for Diagnostics of mechanical systems with particular focus on the numerical solution of engineering problems. The acquisition of a good familiarity with analysis and data processing with special software will be one of the aims of the course. |
| Course contents     | Topics covered include: a) Introduction to signal analysis and data processing with Matlab: - the course introduces the student to the fundamentals of dynamics, simulation and identification of mechanical systems by using computational tool Matlab (de facto standard software   |

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|  | <p>for technical computing). We start from elementary algebraic operations and proceed to matrix eigenvalue problems and modeling of continuum systems. b) Diagnostics of mechanical systems; elements theory and applications: - inverse problem in mechanics and application to simple examples with Matlab. Introduction to data processing techniques; locking on controlled parameters for diagnostic purposes. Modeling of problems and interpretation of numerical results. Application to simple engineering structures and to biomechanics.</p> |
| <b>Teaching methods</b>                            | <p>Lectures (hours/year in lecture theatre): 35 Practical class (hours/year in lecture theatre): 18<br/>Practicals / Workshops (hours/year in lecture theatre): 0</p>  |
| <b>Reccomended or required readings</b>            | <p>Handouts and documents given by the teacher</p>   |
| <b>Assessment methods</b>                          | <p>Assignments are project-oriented relating to mechanical engineering topics. Final examination consists of written test and oral presentation</p>  |
| <b>Further information</b>                         |  |
| <b>Sustainable development goals - Agenda 2030</b> | <p><a href="#">\$Ibl legenda sviluppo sostenibile</a></p>  |



| MECHANICAL TECHNOLOGY |   |
|-----------------------|---|
| Enrollment year       | 2016/2017   |
| Academic year         | 2018/2019   |
| Regulations           | DM270   |
| Academic discipline   | ING-IND/16 (PRODUCTION TECHNOLOGIES AND SYSTEMS)  |
| Department            | DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING   |
| Course                | INDUSTRIAL ENGINEERING  |
| Curriculum            | Meccanica   |
| Year of study         | 3°  |
| Period                | 1st semester (01/10/2018 - 18/01/2019)  |
| ECTS                  | 6   |
| Lesson hours          | 45 lesson hours   |
| Language              | Italian   |
| Activity type         | WRITTEN AND ORAL TEST   |
| Teacher               | VIPERINO ANNARITA - 6 ECTS  |
| Prerequisites         | No requirements   |
| Learning outcomes     | At the end of the course, the student will have a base knowledge of mechanical technology and processing systems, the main production processes, the processing cycles and the machines needed for their realization.   |
| Course contents       | <p>INTRODUCTION TO THE PRODUCTION PROCESSES: the industrial production, the product design, concurrent design, the design of the product for the manufacture, assembly and maintenance, design criteria, the design of the product to the environment, the life cycle of the product, the choice of materials, the choice of production processes, lean manufacturing.</p> <p>MECHANICAL TESTS AND THE PROPERTIES OF THE METALLIC AND NON-METALLIC MATERIALS: the mechanical behaviour of</p> |

materials, tensile test, compression test, torsion test, bending test, hardness tests: Brinell, Vickers and Rockwell, impact test with Charpy pendulum. Composition of materials, classification of the materials used in industrial field. The structural properties. Resistance to corrosion, pickling. The physical properties. The technological properties. The production of steel.

Machining Processes and Machine Tools: fundamentals of machining, machine-tool structures, motions of a machine tool, classification of machine tools. The lathe, operations related to turning. Selection of turning parameters: forces that arise during a processing, determination of the cutting speed in the roughing and finishing, working time, security measures. Tools for metal cutting: introduction, chip formation, chip shapes, machining parameters, tool geometry, tool materials, tool wear, choice of cutting parameters. Lubrication.

MILLING: definition and procedures, milling machines, the geometry of the milling cutters, processes for milling, cutting parameters.

DRILLING, REAMING AND THREAD: introduction, short hole drilling tools, tools for deep holes, the drill architecture and functional characteristics of the different types, twist drills, cutting parameters, reaming, machine tools for the construction of the threads.

MACHINING WITH LINEAR CUTTING MOTION AND RECIPROCATING RECTILINEAR MOTION: introduction, broaching (functional characteristics of a broach, construction parameters, cutting parameters), shaper, planer, slotting machine, sawing machines.

MACHINING WITH GRINDING WHEEL: definition of grinding and classification of various m.t., grinders, sanders, the lapping machine, the bench grinder.

FOUNDRY PROCESS: general information, sand casting, permanent mold casting, shell mold casting, environmental impact.

PROCESSING BY PLASTIC DEFORMATION: plastic processing, processing temperature, rolling, drawing, extrusion, forging and stamping.

PROCESSING NON-CONVENTIONAL: sintering, water jet machining, laser cutting and welding machines, electrochemical machining, ultrasonic machining.

#### Teaching methods

Lectures and numerical exercises lessons related to foundry operations, processes for plastic deformation, chip removal. Lectures with practical examples to all the technologies covered in the course.

#### Reccomended or required readings

1. Dispense del corso (Lecture notes)
2. TECNOLOGIA MECCANICA EDIZ. MYLAB. CON E-TEXT. CON ESPANSIONE ONLINE 2014. KALPAKJIAN, SCHMID. casa editrice PEARSON;
3. TECNOLOGIA MECCANICA E STUDI DI FABBRICAZIONE Santochi M., Giusti F., casa editrice AMBROSIANA
4. NUOVO CORSO DI TECNOLOGIA MECCANICA (VOL. 1.2.3) ed. 2012 DI GENNARO, CHIAPPETTA, CHILLEMI casa editrice HOEPLI

#### Assessment methods

The final examination oral is to be able to distinguish between correct and incorrect statements on the topics discussed, in knowing how to answer theoretical questions on the principles and techniques discussed, in knowing how to apply the techniques to practical cases

seen through resolutions of exercises. Rough the 3 parts are valued on an equal footing in the definition of the final grade.

#### Further information

#### Sustainable development goals - Agenda 2030

[\\$bl legenda sviluppo sostenibile](#)