AEROSPACE ENGINEERING (LM52)

(Università degli Studi)

Teaching AERONAUTICAL TECHNOLOGIES

GenCod A003763

Owner professor TERESA PRIMO

Teaching in italian AERONAUTICAL TECHNOLOGIES

Teaching AERONAUTICAL TECHNOLOGIES

SSD code ING-IND/16

Reference course AEROSPACE ENGINEERING

Course type Laurea Magistrale

Credits 6.0

Teaching hours Ore-Attivita-frontale: 54.0

For enrolled in 2018/2019

Taught in 2019/2020

Course year 2

Language INGLESE

Curriculum PERCORSO COMUNE

Location

Semester Secondo-Semestre

Exam type Orale

Assessment Voto-Finale

Course timetable https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION

The course aims to deepen the aspects related to production technologies applied in aeronautical constructions with particular reference to the choice and function performed by the construction materials and the transformation technologies connected to them.
The materials/technologies solutions mainly used for realization of airframe and structures engine will be discussed. The aspects related to the "Workability of materials, for aeronautical application, by chip removal technologies" will be treated. The processes by plastic deformation will be analyzed. The main elements that characterize the Additive Manufacturing technologies will be provided.
The study and classification of light alloys for aeronautical application as well as superalloys for airframe and engine applications will be addressed. In particular, for the nickel and titanium superalloys, the main aspects that characterize their metallurgy and workability will be studied by comparison with the applications. In the field of plastic deformation technologies, the fundamental principles of super plastic forming and its applicability to the aeronautical sector will be illustrated.
At the same time, the aspects relating to assembly processes and in particular those relating to the welding of metallic materials and riveting of the components will be treated. Lastly non-destructive testing for verification of product quality will be tackled.
Numerical exercises will be carried out on some aspects covered in the theory part to familiarize with the physical quantities that characterize them, in addition to laboratory exercises that will be focused on tools for the finite element simulation of: chip removal, forging and additive processes.

REQUIREMENTS

It is necessary to have passed Mechanical Technology exam. Knowledge of Technical Industrial Design exam is useful.

COURSE AIMS

- Knowledge of materials for aeronautical application and processes for their transformation
- Basic knowledge for the characterization of Nichel and Titanium superalloys
- Basic knowledge for characterization and use of Additive Manufacturing technologies
- Basic knowledge for finite element simulation of chip removal, forging and additive processes.

TEACHING METHODOLOGY	Frontal lessons and computer lab exercises
ASSESSMENT TYPE	The exam consists of two tests: 1. in the first test (written), the student must solve a task related to the topics covered during the course; the test aims to determine student's ability to perform autonomously calculations related to the physical quantities that characterize the machining processes discussed during the course. 2. in the second test (oral) the student discusses both the written and other contents of the course, illustrating their level of knowledge and understanding of the topics covered and in order to make relevant cinematic and dynamic analysis.
ASSESSMENT SESSIONS	According to the academic calendar.
FULL SYLLABUS	▪ Critical analysis of materials/processes for aeronautical application by comparison with the reference context. ▪ Exercises on the topics covered. ▪ Machinability by chip removal of materials for aeronautical application. ▪ Exercises on the topics covered. ▪ Hot workability of metallic materials: Forging. ▪ Aluminum, Nichel and Titanium alloys. ▪ Jointing technologies: welding, bonding, fasteners. ▪ Super plastic forming technology. ▪ Additive Manufacturing technology. ▪ Non-destructive quality control technologies. ▪ Finite element simulation techniques for machining by chip removal, forging, additive and their application to case studies.
REFERENCE TEXT BOOKS	Testi di riferimento ▪ Class Notes. ▪ F.C. Campbell, Manufacturing Technology for Aerospace Structural materials, First Edition, Elsevier, 2006. ▪ Mikell P. Groover, Tecnologia Meccanica.