SCIENCE AND TECHNOLOGY OF COMPOSITES MATERIALS

1.1. Identification

University:	Alma Mater Studiorum – Università di Bologna																	
School:	School of Engineering																	
Course:	Science and technology of composites materials																	
ECTS:	6																	
Semester:	*Winter*						X	*Summer*										
Category	*Fundamental course*						X	*Specialisation course*										
Module	*MFI*		*MFII*	X	*MFIII*			*MSI*		*MSII*		*MSIII*						
Teachers:	Antonio Motori																	
Language:	*English*	X	*Italian*	X	*Swedish*			*Spanish*										

1.2. Learning-outcomes

- Knowledge of properties, application and manufacturing technology of main composite materials.
- Comprehension of the mechanisms which allow to obtain particular properties on the basis of material components and their architecture.
- Ability in the choice of the most suitable composite material on the basis of the technological requirements of the product.

1.3. Competencies

- **General**
  - to have critical understanding of technical and scientific tools
  - communication skills
  - to work in an international context

- **Specific**
  - to understand the advantages that composite materials can introduce in technical design.
  - the complete rethinking of an established design in terms of composites

1.4. Contents

General characteristics of composite materials. Structure and properties of metal, ceramic and polymer matrix. Structure and properties of the main particles and fibres

used in composites. Microstructure of composite materials. Interfaces and their effects on the properties of composites. Concepts on mechanics of anisotropic materials. Lamina and laminates. Models for the estimation of the properties of thin laminates, based on the properties of matrix and filler.Main fabrication processes, properties, design concepts and applications of composite materials.

1.5. Teaching Methodology

- Lecture sessions
- laboratory sessions

1.6. Evaluation

- oral evaluation

1.7. Bibliography

- W.D. Callister, *Materials Science and Engineering: An Introduction* , J. Wiley & Sons, New York, 2007.
- D. Gay, S.V. Hoa, S.W. Tsai, *Composite materials: Design and Applications* , CRC Press Inc., New York, 2003.
- P.K. Mallick, *Fiber-reinforced composites* , Marcel Dekker Ltd.
- *Tests and Standards* for the measurements of the main properties of composite materials.