

## 2026 年度シラバス

科目分類/Subject Categories			
学部等/Faculty	/大学院工芸科学研究科（博士前期課程）/大学院工芸科学研究科（博士前期課程）： /Graduate School of Science and Technology (Master's Programs)/Graduate School of Science and Technology (Master's Programs)	今年度開講/Availability	/有/有 : /Available/Available
学域等/Field	/物質・材料科学域/物質・材料科学域： /Academic Field of Materials Science/Academic Field of Materials Science	年次/Year	/1～2年次/1～2年次 : /1st through 2nd Year/1st through 2nd Year
課程等/Program	/材料制御化学専攻/材料創製化学専攻： /Master's Program of Material's Properties Control/Master's Program of Innovative Materials	学期/Semester	/春学期/春学期 : /Spring term/Spring term
分類/Category	/授業科目/授業科目 : /Courses/Courses	曜日時限/Day & Period	/:/

科目情報/Course Information				
時間割番号 /Timetable Number				
科目番号 /Course Number	61660055			
単位数/Credits	1			
授業形態 /Course Type	講義 : Lecture			
クラス/Class				
授業科目名 /Course Title	Materials for Advanced Manufacturing II : Materials for Advanced Manufacturing II			
担当教員名 / Instructor(s)	/トリノ工科大学教員（材料創製化学専攻および材料制御化学専攻ダブル・ディグリープログラムコース）： Related teacher of Polytechnic University of Turin (Double Degree Program course in the Master's Program of Innovative Materials and Material's Properties Control)			
その他/Other	インターンシップ実施科目 Internship	国際科学技術コース提供科目 IGP	PBL 実施科目 Project Based Learning	DX 活用科目 ICT Usage in Learning
	実務経験のある教員による科目 Practical Teacher			
科目ナンバリング /Numbering Code				

授業の目的・概要 Objectives and Outline of the Course	
日	
英	<p>The innovation of materials, starting from their design, through their production processes, to their transformation into sustainable and effectively marketable products is one of the pillars of the Industry 4.0 paradigm. Indeed, materials are the indispensable platform on which to base the development of new technologies. At the same time the economic and environment sustainability of materials/products manufacturing and transformation routes is a key enabling factor to claim for the future of our world and of our society.</p> <p>Within this framework, this course, that is mainly focused on composite materials (both polymeric and ceramic matrixes) for engineering applications and advanced engineering steels, provides graduates with the scientific fundamentals of major composite engineering materials and, for steel, their related primary manufacturing processes, considering how the production technology can influence the ultimate properties and service performance of materials. The current market steel product availability of materials chemistry and products (e.g. blocks, plates, wires, etc.) will be discussed as well as the</p>

	trends for next future development. The application driven methodology for materials selection will be given to students: how to define technical requirements for materials according to specific application needs. Further to theoretical study of the properties of different materials, laboratory activities and design calculations will develop the ability to apply the acquired knowledge to the critical study of materials properties and how they relevantly apply to the different engineering applications.
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学習の到達目標 Learning Objectives	
日	複合工学材料の科学的基盤を築くこと
英	Building a scientific foundation of major composite engineering materials

学習目標の達成度の評価基準 / Fulfillment of Course Goals (JABEE 関連科目のみ)	
日	
英	

授業計画項目 Course Plan			
No.		項目 Topics	内容 Content
1	日		
	英	The common matrixes and reinforcements used for composites	The topic described above will be lectured.
2	日		
	英	The fundamental information about the microstructure-processing-properties relationship for composite materials	The topic described above will be lectured.
3	日		
	英	How to produce and how to test a composite material	How to produce and how to test a composite material will be explained.
4	日		
	英	Advanced steels	The properties, related applications and relative added value with respect to the application will be lectured.
5	日		
	英	Modern steel making in relation to the devoted market sector and to the environment impact	Modern steel making in relation to the devoted market sector and to the environment impact
6	日		
	英	The role of heat treatment processes and related technologies on advanced steel properties	The role of heat treatment processes and related technologies on advanced steel properties will be lectured.
7	日		
	英	The basic micro- and macro-mechanics models of metallic and composite materials	The basic micro- and macro-mechanics models of metallic and composite materials will be lectured.
8	日		
	英	Sumarry	Summarize this lecture.
9	日		
	英		
10	日		
	英		
11	日		
	英		

	英		
12	日		
	英		
13	日		
	英		
14	日		
	英		
15	日		
	英		

履修条件 Prerequisite(s)	
日	
英	

授業時間外学習（予習・復習等） Required study time, Preparation and review	
日	
英	<p>The following knowledge and skills are required for the correct use of the teaching:</p> <ul style="list-style-type: none"> <li>-Basic knowledge of material properties and their correlation with structure and microstructure (acquired at PoliTo in Materials Science and Technology and Metallic Materials lectures).</li> <li>-Basic knowledge of thermal and mechanical properties of thermosetting and thermoplastic polymeric materials (acquired at PoliTo in the Science and Technology of Polymeric Materials lectures).</li> <li>-Basic knowledge of characterization methods for polymeric/metallic/ceramic materials (acquired at PoliTo in the Materials Science and Technology and Metallic Materials lectures).</li> </ul>

教科書／参考書 Textbooks/Reference Books	
日	
英	<ul style="list-style-type: none"> <li>- Ever J. Barbero. "Introduction to composite materials design" - Boca Raton: CRC Press, 2018.</li> <li>- L. Carlsson, D. Adams, B. Pipes. "Experimental characterisation of advanced composite materials", CRC Press.</li> <li>- Mel M. Schwartz. Composite Materials, Volume I: Properties, Non-Destructive Testing, and Repair, Prentice Hall</li> </ul>

成績評価の方法及び基準 Grading Policy	
日	
英	<p>Optional oral exam; Group project; Computer-based written test in class using POLITO platform.</p> <p>The course Materials for Advanced Manufacturing (12 CFU) consists of two modules Materials for Advanced Manufacturing I (8 CFU, first teaching period) and Materials for Advanced Manufacturing II (4 CFU, second teaching period). The examinations of the two modules are separate and contribute with weighted average to determine the final grade of the course.</p> <p>For module Materials for Advanced Manufacturing I, the grading system is different for attending and non-attending students.</p>

留意事項等 Point to consider	
日	
英	