2025 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	/材料創製化学専攻/材料制御化学専攻：/Master's Program of Innovative Materials/Master's Program of Material's Properties Control	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	61660056			
単位数/Credits	2			
授業形態 /Course Type	講義：Lecture			
クラス/Class				
授業科目名 /Course Title	Materials & Design : Materials & Design			
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	Industry 4.0 claims for the continuous introduction of affordable and sustainable technological innovations. Newly conceived materials and related production and transformation routes can pave the way to new disruptive products/technologies. The design of such developments has nowadays to account not only for technical performances and costs, but also for the efficient use of raw materials, for energy savings and for the whole service life and post-life of products. In this framework, it is essential to increase the awareness of future engineers on materials design issues and tools. The aim of the course is to make the decisive step to move students' attitude from passive materials users/selectors to pro-active materials designers. This result will be accomplished by providing to graduates increasing knowledge on materials design and development. The course will aim at describeing:

	(a) Design tools for Materials Design & Development (b) Consolidated success stories in Materials Design (c) Materials Design projects and laboratories (d) Future trends in Materials Design

学習の到達目標 Learning Objectives	
日	材料設計と開発に関する知識を習得する
英	To acquire knowledge of materials design and development

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	Design rules for technological materials I	Design rules for technological materials, accounting for the required application performances and for their whole life cycle will be lectured.
2	日		
	英	Design rules for technological materials II	Design rules for technological materials, accounting for the required application performances and for their whole life cycle will be lectured again.
3	日		
	英	Awareness for exploring multi-materials development projects and for potential substitution of consolidated materials	The topic mentioned above will be lectured.
4	日		
	英	Concept of multi-scale materials design	Chemical analysis basic formulation; processing and post-processing elaboration; thermal treatment and surface finishing refining will be given.
5	日		
	英	Multipurpose materials design I	Multipurpose materials design I
6	日		
	英	Multipurpose materials design II	Multipurpose materials design accounting for technical performance, materials processability, materials sustainability, international and specific sectors standards and certification will be given again.
7	日		
	英	Vision for exploring future trends on materials design I	Vision for exploring future trends on materials design will be explained.
8	日		
	英	Vision for exploring future trends on materials design II	Vision for exploring future trends on materials design will be explained again.
9	日		
	英	Advanced materials design and their related technological development I	The topic described above will be reviewed.
10	日		
	英	Advanced materials design and their related technological development II	The topic described above will be reviewed.
11	日		
	英	Ability to use practical tools	The topic described above will be lectured.

		for materials design I	
12	日		
	英	Ability to use practical tools for materials design II	The topic described above will be lectured.
13	日		
	英	Multipurpose materials design III	Multipurpose materials design accounting for technical performance, materials processability, materials sustainability, international and specific sectors standards and certification will be given.
14	日		
	英	Multipurpose materials design IV	Multipurpose materials design accounting for technical performance, materials processability, materials sustainability, international and specific sectors standards and certification will be given again.
15	日		
	英	Vision for exploring future trends on materials design III	Vision for exploring future trends on materials design will be explained.

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	The following knowledge and skills are required for the correct use of the teaching: - Basic knowledge of materials families and processes (acquired in dedicated Bch and MsC lectures). - Basic knowledge of materials applied thermodynamics (acquired in dedicated Bch lectures). - Basic knowledge of industrial manufacturing systems (acquired in dedicated MsC lectures).

教科書／参考書 Textbooks/Reference Books	
日	
英	

成績評価の方法及び基準 Grading Policy	
日	Written test; Optional oral exam; Group project
英	

留意事項等 Point to consider	
日	
英	