

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）： /Graduate School of Science and Technology (Master's Programs)	今年度開講/Availability	/有 : /Available
学域等/Field	/物質・材料科学域 : /Academic Field of Materials Science	年次/Year	/1～2年次 : /1st through 2nd Year
課程等/Program	/材料制御化学専攻 : /Master's Program of Material's Properties Control	学期/Semester	/春学期 : /Spring term
分類/Category	/授業科目 : /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	61760025			
単位数/Credits	2			
授業形態 /Course Type	講義・演習・実験 : Lecture/Practicum/Lab			
クラス/Class				
授業科目名 /Course Title	Metal forming technologies : Metal forming technologies			
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>One of the paradigms of the so-called fourth industrial revolution (Industry 4.0) concerns the production of semi-finished and finished products with sustainable materials and processing technologies.</p> <p>Knowledge of the operating principles of both conventional and emerging forming technologies is essential for the correct selection and processing of materials for optimized and sustainable production activities.</p> <p>Based on these considerations, the course provides an overview on the main processing technologies of non-metallic materials for the production of semi-finished and finished products.</p> <p>In particular, after an introduction to the rheological behavior of polymers, conventional and emerging technologies for polymeric and composite materials will be described together with innovative forming technologies for ceramic materials. Laboratory activities on polymer rheology will be organized. The acquired knowledge will finally be used for the development of a group project-work on the selection of materials and forming technologies suitable for the production of semi-finished or finished products with optimized cost, quality/performance and sustainability.</p>

学習の到達目標 Learning Objectives	
日	
英	<p>Knowledge and understanding on:- Rheology of polymeric fluids</p> <ul style="list-style-type: none"> - Viscoelastic behavior of polymeric fluids - Fundamentals of conventional and emerging processing technologies for plastics and polymer-matrix composites

	<ul style="list-style-type: none"> - Fundamentals of emerging ceramic processing technologies <p>Apply knowledge and understanding and make judgments about:</p> <ul style="list-style-type: none"> - Ability to make rheological measurements on polymeric fluids - Ability to select appropriate materials and processes for the production of a specific object/part <p>Communication skills on:</p> <ul style="list-style-type: none"> - Ability to draw up a technical report - Ability to provide an oral/multimedia technical presentation
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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	Rheology	I. Rheology of thermoplastic polymers. Chemo-rheology of thermoset polymers. [0.5 CFU]
2	日 英	Processing technologies	II. Processing technologies for thermoplastic and thermoset polymers: compounding, extrusion, injection molding, blow molding and other technologies, additive manufacturing. [1 CFU]
3	日 英	Processing technologies	II. Processing technologies for thermoplastic and thermoset polymers: compounding, extrusion, injection molding, blow molding and other technologies, additive manufacturing. [1 CFU]
4	日 英	Processing technologies	III. Processing technologies for polymer-matrix and ceramic-matrix composites: hand lay-up and spray lay-up, autoclave vacuum bagging, resin transfer molding, compression molding, filament winding [1 CFU]
5	日 英	Advanced processing	Advanced processing
6	日 英	Group project and teamwork	V. Group project and teamwork (max 5 students/team) [1 CFU] - The students, divided into groups of maximum 5 components, will have to draw up and present a technical report on the selection of materials and forming technologies for the production on an i
7	日 英	Group project and teamwork	V. Group project and teamwork (max 5 students/team) [1 CFU] - The students, divided into groups of maximum 5 components, will have to draw up and present a technical report on the selection of materials and forming technologies for the production on an i
8	日 英	Group project and teamwork	- Output: written technical report and related oral/multimedia presentation (see Test B in the exam section).
9	日 英		
10	日 英		
11	日 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	Self-assessment sessions will be provided along with the course using an online based platform after each main topic of the course is completed.

教科書／参考書 Textbooks/Reference Books	
日	
英	Slides and notes provide by the professor C. Bonten, Plastics technology, Hanser, 2019 (ISBN 978-1-56990-767-2; E-Book ISBN 978-1-56990-769-9) Lecture slides; Text book; Student collaboration tools;

成績評価の方法及び基準 Grading Policy	
日	
英	Exam: Group project; Computer-based written test in class using POLITO platform; The final grade of the "Materials forming" course (10 CFU) is given by the weighted average of the grades obtained in the modules "Metal forming technologies" (6 CFU) and "Non metallic materials forming technologies" (4 CFU). With regard to the module "Non metallic materials forming technologies", the assessment is carried out with the following methods and criteria: - Test A: final written test (maximum grade 20 points). - Test B: written technical report on the group project-work (maximum grade 10 points). - Non mandatory extra activities : i) laboratory activity and related report; ii) presentation and peer-assessment on the group project-work (maximum grade 4 extra points) Test A consists of multiple choice questions (from 5 to 10) and open questions (from 3 to 5) on the topics covered during classroom lessons. Test A is conducted in class using the student's personal laptop (esami.polito.it platform) and has a maximum duration of 60 minutes. To pass the entire exam, Test A requires a minimum grade of 10 points. In the attribution of the final scores, the level of theoretical knowledge acquired and the ability to apply the knowledge acquired (Tests A and B) are predominantly assessed. The level of independent judgment and communication skills will also be taken into consideration (Test B).

留意事項等 Point to consider	
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英	