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	/秋学期：/Fall 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	61760024			
単位数/Credits	2			
授業形態 /Course Type	講義・演習：Lecture/Practicum			
クラス/Class				
授業科目名 /Course Title	Physical chemistry of dispersed systems : Physical chemistry of dispersed systems			
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	The aim of the course is to provide students with the basic knowledge necessary to understand the main phenomena occurring in heterogeneous finely dispersed systems, and to quantitatively predict and control their dynamics. In particular, at the end of the course the student should know the main evolution mechanisms of a dispersion and be able to select proper methods to control or modify the size distribution and the morphology of a disperse phase.

学習の到達目標 Learning Objectives	
日	to provide students with the basic knowledge necessary to understand the main phenomena occurring in heterogeneous finel
英	to provide students with the basic knowledge necessary to understand the main phenomena occurring in heterogeneous finely dispersed systems, and to quantitatively predict and control their dynamics

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	Mechanics and thermodynamics of interfaces (1)	Interfacial tension, Young-Laplace equation, Capillary rise, Contact angle.
2	日		
	英	Mechanics and thermodynamics of interfaces (2)	Adsorption and Gibbs isotherm, Kelvin equation and capillary condensation.
3	日		
	英	Mechanics and thermodynamics of interfaces(3)	Dynamic effects on surface tension and contact angle.
4	日		
	英	Surface forces in dispersed systems(1)	Van der Waals forces, Electrical double layer interaction
5	日		
	英	Surface forces in dispersed systems(2)	Surface forces in dispersed systems(2)
6	日		
	英	Surface forces in dispersed systems(3)	Steric stabilisation; Structural forces, Capillary forces.
7	日		
	英	Structure of the solid-liquid interface and electrical double layer (1)	Mechanisms of surface charge generation, Ion and charge distribution.
8	日		
	英	Structure of the solid-liquid interface and electrical double layer (2)	Mechanisms of surface charge generation, Z potential.
9	日		
	英	Structure of the solid-liquid interface and electrical double layer (3)	Mechanisms of surface charge generation, Electrokinetic phenomena.
10	日		
	英	Evolution of a disperse system (1)	Aggregation-coalescence: kinetics and mechanisms (Brownian).
11	日		
	英	Evolution of a disperse system (2)	Aggregation-coalescence: kinetics and mechanisms (Shear flow).
12	日		
	英	Evolution of a disperse system (3)	Aggregation-coalescence: kinetics and mechanisms (Turbulent, inertia).
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	The course consists of theoretical lessons and practical sessions, with numerical exercises concerning the application of the theory.

教科書／参考書 Textbooks/Reference Books	
日	.
英	Handouts for some aspects of the course are available on the portal. The suggested textbook for the remaining part of the program is J.C. Berg, An Introduction to Interfaces and Colloids: The Bridge to Nanoscience, World Scientific. Other suggested references: H.J. Butt, K. Graf, M. Kappl, Physics and Chemistry of Interfaces, Wiley-VCH. P.C. Hiemenz, R. Rajagopalan, Principles of Colloid and Surface Chemistry, CRC Press. J.W. Mullin, Crystallization, Butterworth.

成績評価の方法及び基準 Grading Policy	
日	
英	The exam is aimed at ascertaining the knowledge of the subjects listed in the course syllabus and the ability to apply the theory and related calculation methods to practical applications. The written part of the test lasts approximately two hours. It contains short theoretical questions, to ascertain the knowledge of the basic aspects of the subject, and simple numerical problems to verify the ability to quantitatively predict the response of a system. No notes, handouts or books may be kept or consulted during the test. The result of the exam is communicated on the teaching portal, together with the date on which the students can view the test and give the optional oral exam. After the written test, the exam can be concluded (in this case the maximum grade is 27/30) or it can be continued with an additional oral exam, which aims at evaluating in depth the comprehension of the subject and the ability to apply the theoretical results.

留意事項等 Point to consider	
日	
英	