

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（博士後期課程）： /Graduate School of Science and Technology (Doctoral 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	/1～3年次：/1st through 3rd Year
課程等/Program	/物質・材料化学専攻：/Doctoral Program of Materials Chemistry	学期/Semester	/第1クォータ：/First quarter
分類/Category	/授業科目：/Courses	曜日時限/Day & Period	/集中：/Intensive

科目情報/Course Information				
時間割番号 /Timetable Number	81302101			
科目番号 /Course Number	81360011			
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	立体機能物質化学：Stereochemical Aspects in Synthetic Organic Chemistry, Advanced			
担当教員名 /Instructor(s)	/中 建介/楠川 隆博：NAKA Kensuke/KUSUKAWA Takahiro/			
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	最新の立体選択的な有機合成反応に関して、選択性発現の要因と有機合成への利用の両面に重点を置いて講述する。
英	Recent advances in stereoselective organic reactions are described with the emphasis on the origin of the selectivity as well as on their synthetic applications.

学習の到達目標 Learning Objectives	
日	実践的な有機化学の知識を身につける。 有機化学の論理的な研究手法を習得する。
英	To acquire knowledge of practical organic chemistry. To acquire logical research methods in organic chemistry.

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	General Introduction	Significance of Stereocontrol in Organic Synthesis will be presented.
	英	General Introduction	Significance of Stereocontrol in Organic Synthesis will be presented.

2	日	Diastereoselectivity and Enantioselectivity	Difference and relation between diastereoselectivity and enantioselectivity will be described by showing representative examples.
	英	Diastereoselectivity and Enantioselectivity	Difference and relation between diastereoselectivity and enantioselectivity will be described by showing representative examples.
3	日	Enantioselective Preparation of Organic Compounds (1)	The advantages and disadvantages of several methods for asymmetric synthesis will be summarized by showing representative examples.
	英	Enantioselective Preparation of Organic Compounds (1)	The advantages and disadvantages of several methods for asymmetric synthesis will be summarized by showing representative examples.
4	日	Enantioselective Preparation of Organic Compounds (2)	The advantages and disadvantages of several methods for asymmetric synthesis will be summarized by showing representative examples.
	英	Enantioselective Preparation of Organic Compounds (2)	The advantages and disadvantages of several methods for asymmetric synthesis will be summarized by showing representative examples.
5	日	Introduction to Asymmetric Synthesis	General remarks on the asymmetric synthesis will be presented with emphasis on types of asymmetric induction.
	英	Introduction to Asymmetric Synthesis	Introduction to Asymmetric Synthesis
6	日	Lewis Acid-Catalyzed Reactions (1)	Recent advances in the asymmetric Diels-Alder reaction and aldol reaction will be described.
	英	Lewis Acid-Catalyzed Reactions (1)	Recent advances in the asymmetric Diels-Alder reaction and aldol reaction will be described.
7	日	Lewis Acid-Catalyzed Reactions (2)	Recent advances in the asymmetric alkylation of aldehydes, ketones, and relevant functionalities will be presented.
	英	Lewis Acid-Catalyzed Reactions (2)	Recent advances in the asymmetric alkylation of aldehydes, ketones, and relevant functionalities will be presented.
8	日	Transition Metal-Catalyzed Reaction (1)	Recent advances in the transition metal-catalyzed redox reactions, including asymmetric epoxidation, dihydroxylation, carbonyl reduction, and hydrogenation, will be described.
	英	Transition Metal-Catalyzed Reaction (1)	Recent advances in the transition metal-catalyzed redox reactions, including asymmetric epoxidation, dihydroxylation, carbonyl reduction, and hydrogenation, will be described.
9	日	Transition Metal-Catalyzed Reaction (2)	Recent advances in the transition metal-catalyzed carbon-carbon bond-forming reactions, including asymmetric allylation, Heck, Cross-coupling, and carbonyl addition reactions, will be described.
	英	Transition Metal-Catalyzed Reaction (2)	Recent advances in the transition metal-catalyzed carbon-carbon bond-forming reactions, including asymmetric allylation, Heck, Cross-coupling, and carbonyl addition reactions, will be described.
10	日	Transition Metal-Catalyzed Reaction (3)	Recent advances in the transition metal-catalyzed carbon-carbon bond-forming reactions, other examples.
	英	Transition Metal-Catalyzed Reaction (3)	Recent advances in the transition metal-catalyzed carbon-carbon bond-forming reactions, other examples.
11	日	Organocatalyst (1)	Recent advances in asymmetric synthesis by using organocatalysts will be summarized with particular emphasis on the molecular design of the catalysts.
	英	Organocatalyst (1)	Recent advances in asymmetric synthesis by using organocatalysts will be summarized with particular emphasis on the molecular design of the catalysts.
12	日	Organocatalyst (2)	A combinatorial approach in the development of organocatalysts will be briefly reviewed.
	英	Organocatalyst (2)	A combinatorial approach in the development of organocatalysts will be briefly reviewed.
13	日	Asymmetric Desymmetrization (1)	The characteristic features of enantiotopic group differentiation in asymmetric synthesis will be presented by showing several representative examples.
	英	Asymmetric Desymmetrization (1)	The characteristic features of enantiotopic group differentiation in asymmetric synthesis will be presented by showing several representative examples.
14	日	Asymmetric	Recent advances in asymmetric desymmetrization, especially those based upon a

		Desymmetrization (2)	catalytic approach, will be reviewed.
	英	Asymmetric Desymmetrization (2)	Recent advances in asymmetric desymmetrization, especially those based upon a catalytic approach, will be reviewed.
15	日	Stereochemical Aspects in Synthetic Organic Chemistry, Advanced	Summary
	英	Stereochemical Aspects in Synthetic Organic Chemistry, Advanced	Summary

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	<ul style="list-style-type: none"> ・有機化学の素養を幅広く身につけていること。 ・各回の授業に対して、予習と復習を合わせて3時間程度の学習を要する。これに加え、レポート提出のための学習が必要である。
英	<p>Students should have basic knowledge on the broad-spectrum of organic chemistry. Students should study for about total 3 h before and after each class. Additional study is required for report preparation.</p> <p>Quotations from others should be minimum and, if quoted, they should be clearly indicated in your report with proper citations.</p>

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	指定した課題へのレポートにより評価する。
英	Evaluation by reports on assigned topics.

留意事項等 Point to consider	
日	
英	