Course Numbering	TCH-BIO305J
Year	First semester 2025
Subject (J)	Chemical and Biomolecular Engineering II
Subject	Chemical and Biomolecular Engineering II
Credit(s)	2Credits
Instructor	DAISUKE NAGAO,ATSUSHI TAKAHASHI,HIKARU NAKAZAWA,HAJIME OHNO,SEIJI TAKAHASHI,NAOYA MOROHASHI,YASUHIRO ISHIMARU
Media Class Subjects	〇
Essential Subjects	〇
Language of Instruction	
Course Objectives and Summary/ Learning Goals (J)	Google Classroomのクラスコードは工学部Webページにて確認すること。 学部シラバス・時間割(https://www.eng.tohoku.ac.jp/edu/syllabus-ug.html) Chemical and Biomolecular Engineering II refers to any technological applications of chemical and biological systems, such as biomolecules and environmental materials to make or modify products or green processes for specific purposes. This class focuses on biomaterials, biomedical engineering, membrane transport, protein engineering, environmentally benign materials and reactions, biomass conversion, fluid dynamics, green process and industrial processes. Students will learn some basic aspects of engineering for biotechnology, biological and environmental materials.
Course Objectives and Summary/ Learning Goals	The class code for Google Classroom can be found on the Web site of the School of Engineering: https://www.eng.tohoku.ac.jp/edu/syllabus-ug.html (JP Only) Chemical and Biomolecular Engineering II refers to any technological applications of chemical and biological systems, such as biomolecules and environmental materials to make or modify products or green processes for specific purposes. This class focuses on biomaterials, biomedical engineering, membrane transport, protein engineering, environmentally benign materials and reactions, biomass conversion, fluid dynamics, green process and industrial processes. Students will learn some basic aspects of engineering for biotechnology, biological and environmental materials.
Relevance to Other Subjects/Considerations for Taking the Class (J)	Knowledge of organic chemistry and biochemistry will be required.
Relevance to Other Subjects/Considerations for Taking the Class	Knowledge of organic chemistry and biochemistry will be required.
Course Description (J)	0 Introduction 1 Protein engineering　by Hikaru NAKAZAWA 1-1 Protein engineering of enzyme 1-2 Protein engineering and synthetic biology 2 Plant specialized metabolites by Seiji TAKAHASHI 2-1 Basic sciences and histories of use 2-2 Metabolic engineering for production of valuable metabolites 3 Development of environmentally benign materials by Naoya MOROHASHI 3-1 Host–guest chemistry and separation materials using host molecules 3-2 Separation materials using host molecules 4 Plant membrane biotechnology by Yasuhiro ISHIMARU 4-1 Application of plant membranes to biotechnology 4-2 Application of plant membranes to agriculture 5 Process evaluation　by Hajime OHNO 5-1 Process simulation for innovative technologies 5-2 Process evaluation based on lifecycle thinking 6 Sustainable reaction process engineering by Atsushi Takahashi 6-1 Catalytic strategies for biomass conversion into valuable chemicals 6-2 Innovative technologies for sustainable fuel production 7 Process engineering for functional materials by Daisuke NAGAO 7-1 Process design of particulate materials 7-2 Interface control to design functional materials processing

Course Description	0 Introduction 1 Protein engineering　by Hikaru NAKAZAWA 1-1 Protein engineering of enzyme 1-2 Protein engineering and synthetic biology 2 Plant specialized metabolites by Seiji TAKAHASHI 2-1 Basic sciences and histories of use 2-2 Metabolic engineering for production of valuable metabolites 3 Development of environmentally benign materials by Naoya MOROHASHI 3-1 Host–guest chemistry and separation materials using host molecules 3-2 Separation materials using host molecules 4 Plant membrane biotechnology by Yasuhiro ISHIMARU 4-1 Application of plant membranes to biotechnology 4-2 Application of plant membranes to agriculture 5 Process evaluation　by Hajime OHNO 5-1 Process simulation for innovative technologies 5-2 Process evaluation based on lifecycle thinking 6 Sustainable reaction process engineering by Atsushi Takahashi 6-1 Catalytic strategies for biomass conversion into valuable chemicals 6-2 Innovative technologies for sustainable fuel production 7 Process engineering for functional materials by Daisuke NAGAO 7-1 Process design of particulate materials 7-2 Interface control to design functional materials processing
Preparation and Review(J)	Preparation: If students are asked to read some textbooks and handouts, they should read them before the lecture and understand the theories of not being clear. This gives you more from the lecture. Review: Students should study the handouts supplied in lecture again.
Preparation and Review	Preparation: If students are asked to read some textbooks and handouts, they should read them before the lecture and understand the theories of not being clear. This gives you more from the lecture. Review: You should study the handouts supplied in lecture again.
Evaluation methods and criteria (J)	レポート、課題、授業で実施する小テスト等により学修目標への達成度を総合的に評価する。
Evaluation methods and criteria	Grades are comprehensively evaluated by reports, assignments, quizzes conducted in classes, etc.

Textbooks and references

Title	Author	Publisher	Year	ISBN/ISSN	Classification

URL	
Attached File	
Office Hours(J)	10:00-18:00. Making an appointment is required.
Office Hours	10:00-18:00. Making an appointment is required.
Contact： Please insert '@' in the email address.	クラスルームで連絡可能
Notes	

Practical Skill/Hands-on Class	○
Other Comments/Instructions	
Last Update	2024/02/07 15:56:15

One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside of class. In laboratory, practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.