

Elective Course Description (2. Spring Semester)

Subject (English)	Chemical and Biomolecular Engineering I	Semester	Spring	Day/Slot	
科目名 (日本語)	化学・バイオ工学 I				
Course Code		Course Numbering	TCH-MAC303	Period	Apr. – Aug.
Instructor (Post)	Prof. Yuji Matsumoto			Campus	
				Building	
Faculty	Department of Applied Chemistry, Chemical Engineering and Biomolecular Engineering	Credits	2	Class Room	
Class subject	-				
Object and summary of class	<p>We are surrounded by a large number of chemical products manufactured with various types of materials including organic, inorganic and their composite materials. Even in our body, biological materials are constantly being produced using a variety of chemical and biochemical reactions. The present course objective is to provide chemistry-oriented topics in developing such functional materials in various areas.</p>				
Keywords	-				
Goal of study	<p>Students will learn some basic aspects of chemical production, with special emphasis on how environment-friendly synthetic methodologies of materials have been developed for new advanced products.</p>				
Contents and progress schedule of class	<ol style="list-style-type: none"> 1. Chemistry of materials processing in vacuum <ol style="list-style-type: none"> 1.1 Basic vacuum technology for materials processing 1.2 Vacuum deposition techniques of inorganic and organic thin film materials 2. Chemical functions of coordination compounds <ol style="list-style-type: none"> 2.1 Basic concepts of coordination chemistry 2.2 Applications to functional materials and biomedicine 3. Chemistry of composite materials in wet processing <ol style="list-style-type: none"> 3.1 Wet chemical processing for composite particles and thin films 3.2 Controls over sizes and morphologies of composite particles 4. Particle dynamics in nanofluids <ol style="list-style-type: none"> 4.1 Aggregation / dispersion of particles 4.2 Aggregation kinetics and colloidal dynamics 5. Thermophysical Properties of Polymers and Polymer Solutions <ol style="list-style-type: none"> 5.1 Volumetric Properties of Polymers 5.2 Phase Equilibria of Polymer Solutions 6. Catalytic production of chemicals from biomass <ol style="list-style-type: none"> 6.1 Production of pure platform chemicals from biomass 6.2 Conversions of biomass-derived platform chemicals 7. Chemistry of Carbon Nanomaterials <ol style="list-style-type: none"> 7.1 Structure and bonding in organic molecules 7.2 Fullerenes, carbon nanotubes and graphene 				
Preparation	Knowledge on fundamental chemistry is required.				
Record and evaluation method	Examinations and/or reports, depending on topics. No make-up exam.				
Textbook and references	None. The handout and/or prints will be delivered by each instructor in his/her class.				
Self study	-				
In addition	-				