

Toyama College		Year	2022		Course Title	Advaced Lecture on Physical Chemistry
Course Information						
Course Code	0044		Course Category	Specialized / Elective		
Class Format	Lecture		Credits	Academic Credit: 2		
Department	ECOdesign Engineering Course		Student Grade	Adv. 1st		
Term	First Semester		Classes per Week	2		
Textbook and/or Teaching Materials	In this lecture, resumes are used. Reference text books helping you to understand contents are introduced in the lecture					
Instructor	Yamagishi Masakazu					
Course Objectives						
This course will facilitate understanding microscopic mechanism of material functionalities. You are required to explain your research field from microscopic point of view.						
Rubric						
		Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)		
Evaluation 1		Generally explains orbitals in solid materials.	Generally explains quantum number, atomic orbital, and molecular orbital.	Unable to explain quantum number, atomic orbital, and molecular orbital.		
Evaluation 2		Ability to discuss spectrum, associating to molecular kinetics.	Able to generally explain relationship between spectrum and molecular kinetics.	Unable to explain relationship between spectrum and molecular kinetics.		
Evaluation 3		Clearly formulates molecular kinetics and chemical reactions.	Generally explains types of molecular kinetics and chemical reactions.	Unable to explain types of molecular kinetics and chemical reactions.		
Evaluation 4		Abilities to discuss your research from microscopic point of view and to explain it to researchers in other fields.	Able to explain your research to researchers in other fields.	Unable to explain your research to researchers in other fields.		
Assigned Department Objectives						
学習・教育到達度目標 A-6 JABEE 1(2)(d)(1) JABEE 1(2)(e)						
Teaching Method						
Outline	In this curse, you will learn about the microscopic mechanisms of various physicochemical phenomena. The phenomena introduced in this class are limited, so you will deeply consider information and knowledge obtained in this class to adapt them to phenomena in your field.					
Style	Lectures facilitate the learning of physicochemical phenomena. Main subjects of these lectures are general views of each phenomena rather than detail formulation.					
Notice	Can take makeup exam in need aid up to maximum of 60					
Characteristics of Class / Division in Learning						
☐ Active Learning		☐ Aided by ICT		☐ Applicable to Remote Class		☐ Instructor Professionally Experienced
Course Plan						
			Theme	Goals		
1st Semester	1st Quarter	1st	Nature of electrons and Schrödinger equation-1-	Introduction of nature of electrons and Schrödinger equation.		
		2nd	Nature of electrons and Schrödinger equation-2-	Explains relationship of quantum numbers obtained from Schrödinger equation to atomic and molecular shapes.		
		3rd	Rotation spectrum and vibration spectrum-1-	Generally explains microscopic mechanism of rotation spectrum.		
		4th	Rotation spectrum and vibration spectrum-2-	Generally explains microscopic mechanism of vibration spectrum.		
		5th	Crystal structure and reciprocal lattice space	Can associate periodicity of crystals to reciprocal lattice vector and discuss them.		
		6th	Diffraction and structure	Can explain diffraction phenomena, relating it to reciprocal lattice space.		
		7th	Electrical properties of molecules	Can distinguish materials based on band structures and electric dipoles		
		8th	Magnetic properties of molecules	Using magnetic dipoles of molecules, can distinguish materials and explain magnetic properties of the materials.		
	2nd Quarter	9th	Molecular kinetics and chemical reactions-1-	Formulates various type of molecular kinetics and explains important physical constant.		
		10th	Molecular kinetics and chemical reactions-2-	Associating to dynamic molecular movements, can explains chemical reactions		
		11th	Phenomena on solid surfaces	Generally explains dynamic phenomena on solid surface		
		12th	Adsorption onto solid surfaces-1-	Generally explains adsorption mechanism.		
		13th	Adsorption onto solid surfaces-2-	Be able to explain catalytic reactions on solid surfaces.		

		14th	Dynamic phenomena in electrochemical process	Generally explains dynamic phenomena in electrochemical processes.
		15th	Final exam	
		16th	Summary	Summarize the study contents and confirm grades.

Evaluation Method and Weight (%)							
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	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	40	0	0	0	60	0	100
Basic Ability	0	0	0	0	0	0	0
Technical Ability	40	0	0	0	40	0	80
Interdisciplinary Ability	0	0	0	0	20	0	20