Anan College	Year	2024	Course Title	Fundamental Experiments in Materials Chemistry 1

Course Information

Course Code	1412T11	Course Category	Specialized / Compulsory
Class Format	Experiment / Practical training	Credits	School Credit: 2
Department	Course of Chemical Engineering	Student Grade	2nd
Term	First Semester	Classes per Week	前期:4
Textbook and/or Teaching Materials	Handout (Fundamental Experiments in Materials Chemistry 1), Fundamentals of Chemistry (Daiichi Gakushu-sha), Chemistry (Daiichi Gakushu-sha)		
Instructor	Sugiyama Yuuki,Zheng Tao		

Course Objectives

1. The students will observe chemical reactions and logically consider the phenomena.
2. The students will learn how to prepare reports using experimental data.
3. The students will learn qualitative analysis of cations.
4. The students will learn quantitative analysis (neutralization titration, redox titration, chelatometric titration).

Rubric

	Ideal Level	Standard Level	Minimum Level
Objective 1	The student will logically and appropriately consider chemical reactions.	The student will logically consider chemical reactions.	The student will consider chemical reactions.
Objective 2	The student will prepare a logical and appropriate report using the experimental data.	The student will prepare a logical report using the experimental data.	The student will prepare a report using the experimental data.
Objective 3	The students will understand each reaction of cations and be able to carry out experiments for systematic qualitative analysis smoothly.	The students will carry out experiments for systematic qualitative analysis smoothly.	The students will carry out experiments for systematic qualitative analysis.
Objective 4	The students will understand the similarities and differences between neutralization titration, redox titration, and chelatometry in quantitative analysis and be able to proceed smoothly with the experiments.	The students will use neutralization titration, redox titration, and chelatometry in quantitative analysis and be able to proceed smoothly with the experiments.	The students will use neutralization titration, redox titration, and chelatometry in quantitative analysis and be able to proceed with the experiments.

Assigned Department Objectives

学習・教育到達度目標 D-2 学習・教育到達度目標 D-4

Teaching Method

Outline	To understand and master chemistry as an academic discipline, it is essential to take classes in each specialized subject and conduct experiments in chemistry. This course is the first experimental course for students after they are assigned to the Chemistry Course. It aims to provide basic knowledge of chemistry experiments (experimental techniques, rules of chemistry laboratories, how to prepare laboratory notebooks, how to discuss experimental results, etc.). This course focuses on analysis, the foundation of chemistry experiments, and aims to provide students with knowledge and skills in fundamental qualitative and quantitative analysis.
Style	Experiments are the foundation of chemistry, and mastery of basic techniques is essential. Students will first consider the purpose of the experiment, learn experimental methods and concepts in the preliminary study, and then confirm them in the experiment to experience and deepen their understanding of the laws of chemistry. After the experiments, students analyze the experimental data obtained through accurate measurements and compile them into a report. If this report writing phase is considered a review, the students will learn the experiment in depth by repeating the chemistry experiment's preparation, experiment, and review phases. Students must complete the experimental plan in the experimental notebook before the experiment begins. At the end of the experiment, students must submit the notebook and report the results and experimental data to the instructor in charge to complete this experiment.
Notice	The following precautions must be taken to ensure the experiment is carried out safely. 1. Eating and drinking are strictly prohibited in the laboratory. 2. Students must wear the prescribed white lab coat and jacket when entering the laboratory. Students with long hair must tie it back. 3. Before starting experiments, students must wear safety glasses and gloves. 4. Students must promptly follow any instructions given by the teacher. 5. Reports must be submitted by the due date. 6. In case of absence, notify the teacher immediately. No credit will be given for any unexperienced work or reports that have yet to be submitted. 7. Grades will be based on reports, notes, examinations, and attitude.

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	Guidance	
		2nd	Writing notes and reports for student experiments	Write notes and reports.
		3rd	Laboratory rules, basic procedures	Understand basic procedures and prepare reagents.
		4th	Qualitative Analysis 1	Separate and confirm cations (genus I).
		5th	Qualitative Analysis 2	Separate and confirm cations (genus III).

		6th	Qualitative Analysis 3	Separate and confirm cations (genus V).
		7th	Qualitative analysis of cations (unknown sample analysis)	Analyze unknown samples for cations.
		8th	Quantitative analysis	Explain the basics of quantitative analysis and write neutralization and redox reaction equations.
	2nd Quarter	9th	Neutralization titration 1	Carry out neutralization titrations and calculate the concentrations of acids and bases.
		10th	Neutralization titration 2	Carry out neutralization titration and calculate concentrations of acids and bases.
		11th	Redox titration	Carry out redox titration and calculate concentrations of oxidants or reductants.
		12th	Chelatometric titration	Carry out chelatometry and calculate the concentration and hardness of complexes.
		13th	Buffer solution	Learn the principles of buffer solutions and can calculate the pH of buffer solutions.
		14th	Water quality examine	Carry out the properties of water and analyze COD, an organic pollution indicator of water quality.
		15th	Instrument Check, examination, submission of notes, and summary of experiments	
		16th	Preliminary Experiment Day/Instrument Check	

Evaluation Method and Weight (%)

	Examination	Quiz	Portfolio	Presentation and Attitude	Other	Total
Subtotal	0	0	0	0	100	100
Basic Proficiency	0	0	0	0	60	60
Specialized Proficiency	0	0	0	0	40	40
Cross Area Proficiency	0	0	0	0	0	0