Anan College	Year	2024	Course Title	Instrumental Analysis

Course Information

Course Code	5496Z01	Course Category	AC / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Course of Civil Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	前期:2
Textbook and/or Teaching Materials	エキスパート応用化学テキストシリーズ　機器分析　大谷肇 編　講談社（ISBN978-4-06-156807-5）		
Instructor	Yamada Yohei		

Course Objectives

After taking this course, you will be able to
1. explain the interaction between electromagnetic waves and materials.
2. explain the measurement principles of the analytical instruments covered in the lecture.
3. discuss and devise analytical methods according to the sample to be measured and the information to be obtained.
4. explain to others the principles of the instruments used in one's own research and the information obtained.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
1. Explain the interaction between electromagnetic waves and matter	You are able to use the equations relating wavelength, frequency, and energy of electromagnetic waves, accurately. You are able to explain at least three specific examples of interactions between electromagnetic waves and matter (electronic transitions, vibrational transitions, etc.).	You are able to use the equations relating wavelength, frequency, and energy of electromagnetic waves. You are able to explain at least two specific examples of interactions between electromagnetic waves and matter (electronic transitions, vibrational transitions, etc.).	If you read textbooks, you are able to use the equations relating wavelength, frequency, and energy of electromagnetic waves. You are able to explain at least two specific examples of interactions between electromagnetic waves and matter (electronic transitions, vibrational transitions, etc.).
2. To be able to explain the measurement principles of the analytical instruments covered in the lecture.	You are able to explain at least six measurement principles of various analytical instruments covered in the textbook. You are able to explain the characteristics of each instrument and how to use them.	You are able to explain at least four measurement principles of various analytical instruments covered in the textbook. You are able to explain the characteristics of each instrument and how to use them.	If you read textbooks, you are able to explain at least four measurement principles of various analytical instruments covered in the textbook. You are able to explain the characteristics of each instrument and how to use them.
3. Discuss and devise analytical methods according to the sample to be measured and the information to be obtained.	You are able to suggest analytical methods according to the sample and the information to be obtained. You are able to image sample preparation.	You are able to suggest analytical methods according to the sample and the information to be obtained.	If you read textbooks, You are able to suggest analytical methods according to the sample and the information to be obtained.
4. Be able to explain to others the principles of the equipment used in his/her research and the information obtained.	You are able to do presentation of your research and explain analytical instruments using in your research. Also, you are able to ask question for research of others, at good pace.	You are able to do presentation of your research and explain analytical instruments using in your research. Also, you are able to ask question for research of others.	You are able to do presentation of your research and explain analytical instruments using in your research.

Assigned Department Objectives

D-1

Teaching Method

Outline	Analytical chemistry is the study of the composition and content of samples and the analysis of their chemical state and existence. Instrumental analysis plays a central role in analytical chemistry and is indispensable in all human activities, including substance development, quality control, environmental investigation, and medical care. In general, analytical instruments are classified based on their principles into electromagnetic analysis, electrical analysis, separation analysis, and others (thermal analysis, mass spectrometry). First, students will learn about the principles and equipment configuration of these analytical instruments. Students will also learn what kind of information can be obtained from the results obtained from these analytical instruments.
Style	Basically classroom learning, but there are also laboratory exercises.
Notice	

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	Introduction to Instrumental Analysis, Interaction of Electromagnetic Waves and Materials	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		2nd	Interaction of electromagnetic waves with matter, UV-Vis	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		3rd	fluorospectrophotometer	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.

		4th	AAS	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		5th	ICP-AES, ICP-MS	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		6th	experimental design for analysis of mineral water by using ICP-AES	experimental design for analysis of mineral water by using ICP-AES.
		7th	Experiment	preparation of standard solution for analysis of mineral water.
		8th	Experiment	ICP-AES measurement
	2nd Quarter	9th	Data handling of the experiment by Excel	Data handling of the experiment by Excel
		10th	FT-IR	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		11th	FT-IR, Raman spectrometry	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		12th	XRD, XRF	You are able to explain the principles of the equipment, how to prepare samples, and how to view the data obtained.
		13th	Presentation of the students	Students will present their own research and the analytical instruments they use.
		14th	Presentation of the students	Students will present their own research and the analytical instruments they use.
		15th	Presentation of the students	Students will present their own research and the analytical instruments they use.
		16th	final exam	final exam

Evaluation Method and Weight (%)

	Examination	Presentation	reports	Total
Subtotal	50	20	30	100
Basic Proficiency	50	20	30	100
Specialized Proficiency	0	0	0	0
Cross Area Proficiency	0	0	0	0