

Toyama College		Year	2022	Course Title	Fundamental Science Experiment
<b>Course Information</b>					
Course Code	0050		Course Category	General / Elective	
Class Format	Lecture		Credits	School Credit: 1	
Department	Department of Electronics and Computer Engineering		Student Grade	2nd	
Term	Second Semester		Classes per Week	2	
Textbook and/or Teaching Materials	Print teaching materials for physical and chemical experiments				
Instructor	Terasaki Yukiko,Ohtake Yukiko				
<b>Course Objectives</b>					
The goal of physics experiments is to learn how to handle measured values and write reports, and to be able to consider experimental results based on knowledge of physics. The goal of chemical experiments is to learn how to handle instruments and experimental operations, and to understand chemical phenomena from measurement results and observation results.					
<b>Rubric</b>					
	Ideal Level		Standard Level		Unacceptable Level
Achievement 1	The error can be estimated correctly.		You can perform the four rules of significant figures according to the rules.		The four rules of significant figures cannot be performed according to the rules.
Achievement 2	You can distinguish between facts and opinions, and support your opinions with facts.		Facts and opinions can be distinguished and considered.		I am confusing the facts with the opinions.
Achievement 3	You can correctly handle the equipment and perform experimental operations, and explain the reason.		How to handle the equipment and experimental operations can be performed correctly.		The handling of the equipment and the experimental operation are incorrect.
Achievement 4	Explain measurement results and observation results in relation to scientific knowledge.		Measurement results and observation results can be associated with scientific knowledge.		Measurement results / observation results cannot be associated with scientific knowledge.
<b>Assigned Department Objectives</b>					
ディプロマポリシー 3					
<b>Teaching Method</b>					
Outline	Conduct about 5 items each of physical experiments and chemical experiments. Each item is a two-time experiment, and the class is divided into halves, and physical and chemical experiments are conducted at the same time. At times other than the experiment, explanations, lectures, exercises, and video lessons for the experiment will be given. In physics experiments, students will be trained to understand physical phenomena through experiments and to analyze experimental data. In chemical experiments, students will be able to acquire abilities such as scientific observation, thinking, and judgment.				
Style	Experiments and lectures				
Notice	Before starting the experiment, explain the experiment and review the basics.				
<b>Characteristics of Class / Division in Learning</b>					
<input checked="" type="checkbox"/> Active Learning		<input checked="" type="checkbox"/> Aided by ICT		<input type="checkbox"/> Applicable to Remote Class	
				<input type="checkbox"/> Instructor Professionally Experienced	
<b>Course Plan</b>					
			Theme	Goals	
2nd Semester	3rd Quarter	1st	orientation	After explaining the syllabus and the entire science experiment, we will explain various precautions regarding chemical experiments, the names and handling methods of instruments, and the handling of chemicals. It also explains various precautions in physics experiments, how to handle data, and how to write reports.	
		2nd	Physical experiment <1> "Significant figures"	Learn how to handle significant figures. Also, use calipers to measure the outer diameter, inner diameter, and depth of familiar objects, and calculate the surface area and volume.	
		3rd	Chemical experiment <1> "Quantitative relationship of chemical reactions"	Investigate the quantitative relationship of the reaction by measuring the mass change due to the reaction.	
		4th	Physical experiment <2> "Measurement of gravitational acceleration"	Gravitational acceleration is measured and compared in two ways.	
		5th	Chemical experiment <2> "Various batteries"	Manufacture a voltaic battery and a Daniell cell, and investigate the difference in electromotive force.	
		6th	Physical experiment <3> "Collision of dolly"	Two bogies collide on the guide truck, the momentum and kinetic energy before and after the collision are obtained, and the values before and after the collision are compared.	
		7th	Chemistry lecture	Learn that the reaction differs depending on the metal ion. Also, learn about the method of phylogenetic analysis.	

4th Quarter	8th	Chemical experiment <3> "Reaction and separation of metal ions"	Observe that the reaction method differs depending on the metal ion. In addition, the results are used to investigate unknown ions.
	9th	Physical experiment <4> "Measurement of work equivalent of heat"	Measure how much the temperature of the metal block rises due to friction, and calculate the work equivalent of heat.
	10th	Physics lecture	The basic properties of waves will be confirmed by demonstration experiments.
	11th	Chemical experiment <4> "Redox titration"	Use the redox reaction to determine the concentration of oxidizing agent / reducing agent.
	12th	Physical experiment <5> "Resonance of air columns"	The wavelength of the sound wave is measured by changing the length of the air column while making a constant sound and searching for the resonance point.
	13th	Chemical experiment <5> "Synthesis and properties of organic compounds"	Examine the properties of alcohols and aldehydes. Also, try synthesizing the ester.
	14th	Preliminary experiment day	
	15th	Final exam	
	16th	Report return / grade confirmation	

#### Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Reports	Total
Subtotal	0	0	0	0	0	100	100
Basic Proficiency	0	0	0	0	0	100	100
Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0