

Elementary Engineering

Experiments

in Syllabus Number

2F204

Basic Major Subjects

Requisites 2 credit

HIRAMOTO, Takashi

1. Course Description

[Entire class] All participants will be gathered together in a single classroom to take the course. The course will focus on lectures and will include exercises and experiments. Lectures will focus on safety training, basic knowledge and basic techniques for experimental measurements, methods of creating figures and tables, and methods of preparing reports.

[Group experiments] The class will be divided into small groups which, under the guidance of the teaching staff, perform one experiment per session, gaining experience of seven experiments in total. Themes of experiments shall include gravity measurements, the motion of falling bodies under resistance, radiation, operational amplifiers and amplification circuits, vacuum experiments, and practical machine processing 1 and 2.

2. Course Objectives

This course enables students to acquire the necessary minimum knowledge and technical skills for performing various engineering experiments, and prepares them for “Aerospace Engineering Experiments 1 and 2,” to be taken in the third year. Students will also learn how to conduct experiments safely and correctly, and to write organized experimental reports.

[Common foundations] Students will learn how to ensure safety during experiments, the use of basic equipment, and the way of writing experimental reports.

[Experiment details] Students will experience the process of making preparations in advance, conducting experiments, and summarizing the results in reports for basic experiments relating to mechanics, radiation, electronics, electrical engineering, vacuums, and machine processing. Through these activities, the knowledge, technical skills, and sense necessary for conducting practical experiments will be acquired.

3. Grading Policy

Evaluation is based on summing all report scores and the examination (held in the 15th lesson) score. All reports are graded out of 100 points. The test is also graded out of 100 points. Course units are approved based on getting a score of 60 or better for all reports. In other words, units cannot be obtained if any one report has a score of less than 60.

The teacher in charge of each test gives report coaching to each student on the report coaching date, and asks for resubmission of the report if it is deficient.

4. Textbook and Reference

Textbook

Textbook: 航空宇宙工学科編 『基礎工学実験解説書2021年度版』... Will be distributed free of charge at guidance.

Textbook: 化学同人編集部編 『第8版 実験を安全に行うために』 化学同人(本体¥800+税) ISBN978-4-7598-1833-8

Other course material ... Will be distributed by teacher as needed.

5. Requirements(Assignments)

Before class: Read in advance the scope of the next lecture in the text being used “Elementary Experiments in Engineering Explanation 2021 Edition”, and sort out the points that you do not understand or have issues with before attending the class. Before attending the safety education lecture, read in advance the text being used “Performing Experiments Safely, 8th Edition”, and sort out the points that you do not understand or have issues with before attending the class. (1 hour)

After class: For the conducted experiments, immediately create the experimental report in the given form while referring to the experimental notes. (2 hours)

6. Note

Do not arrive late or skip class. If you will miss class, notify the teacher in charge and receive instruction within 1 week in principle. There will be supplementary classes on the 9th and 14th classes for students who have missed lessons.

Students who want supplemental lessons should apply directly to the teacher in charge.

7. Schedule

- [1] Overall coursework (1) (Guidance)
- [2] Overall coursework (2) (Lecture (1) of safety education)
- [3] Overall coursework (3) (Lecture (2) of safety education, how to create figures and tables)
- [4] Overall coursework (4) (How to create experiment 1 report (1): How to write experimental reports)

- [5] Overall coursework (5) (How to create experiment 1 report (2): Paper airplane flight experiment, basic knowledge of experimental measurements, basic technique)
- [6] Team experiment (1) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [7] Team experiment (2) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [8] Team experiment (3) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [9] Report guidance and supplementary experiment for people who missed class (1)
- [10] Team experiment (4) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [11] Team experiment (5) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [12] Team experiment (6) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [13] Team experiment (7) (each team will perform 1 different experiment from among experiments 2 to 8 below)
- [14] Report guidance and supplementary experiment for people who missed class (2)
- [15] Overall coursework (6) (Safety education test, summary)

Experiment 2: Measure gravity. Experiment 3: Falling motion of an object subject to resistance. Experiment 4: Radiation. Experiment 5: Op-amp and amplifier circuit. Experiment 6: Vacuum experiment. Experiment 7: Machining training 1 (lathe work). Experiment 8: Machining training 2 (saw bench, drill press, hand finishing)