Elementary seminar of aerospace manufacturing

Syllabus Number 2F102
Basic Major Subjects
Elective Requisites 2 credit

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1. Course Description

This lecture aims to encourage students to experience the fun of aerospace through manufacturing related aerospace (PBL; Problem-based Learing). By learning 4 dynamics (fluid dynamics, material dynamics, thermodynamics, mechanical mechanics) in the 4 years of university, we hope to have students realize how these learning can be utilized. Students will also acquire the knowledge of how to proceed and communication skill as a team (group work) by working on the task with teams.
In this lecture, students will be given three subjects in different fields and will experience engineering by resolving the problem while competing for results in contest format. Three subjects are indicated as follows.
(1)Water rocket contest (Hiroyasu Manako)
Students design a water rocket using PET bottle and compete flight distance.
Students consider the design and condition of a water rocket that flies furthest by considering top shape, wing shape and amount of installed water, etc.
(2)Egg drop contest (Keizo Hashimoto)
Students create a flying object carrying a row egg, and do a contest that allows them quickly and accurately land on the target without braking eggs from the third floor above the ground. Various ideas are necessary to relieve shock at landing. Students must complete making the flying object within time limit by using only construction papers, scissors and adhesive.
(3)Paper plane (Hiroshi Yoneda)
Making and Flying a paper plane that have all the principle of flight let students learn the fundamentals necessary for flying experimentally. Then, students independently design and make a paper plane capable for achievement commensurate with purpose, do a contest and evaluate each other. From these activities students will learn about pleasure and significance of designing themselves.

Students will have the knowledge and techniques related to DP1, DP3, DP4, and DP5.

2. Course Objectives

(1)Through these creations, students will be able to imagine the situation where contents learned by paper studies are utilized for manufacturing.
(2)When students need to solve the engineering problems, they will be able to realize the process and method to solve them.
(3)Students will learn techniques of summarizing the result in reports and presentation, by summarizing the final results.

3. Grading Policy

The attitude towards the issues in every lesson and reports for each subject are evaluated.
The presentation at the final lesson is evaluated also.
Feedback on the contents of evaluation is given at the time presentation.

4. Textbook and Reference

Reference
Akio Kobayashi Reference books for paper plane; Kamihikoki de shiru hiko no genri Kodansha bluebacks
ISBN-13:978-4061327337
Yoshisada Murotsu Reference books for paper plane;
kouku-uchu kougaku nyumon Morikita publishing
ISBN-13:978-4627690325

5. Requirements(Assignments)

Preparation (about 1.5 hour);Please do research independently the design method and engineering theory, etc. for a given subject and learn to use for manufacturing and summarize in a notebook.
Review (about 1.5 hour); Please review the result of your manufacturing and consider how to improve by yourself and summarize it in a notebook and make use of it in the future.

6. Note

7. Schedule

[1] Guidance (Explanation of contents of lecture)
[2] Water rocket (Research and design)
[3] Water rocket (Manufacturing and test)
[4] Water rocket (Improvement design and manufacturing)
[5] Water rocket contest
[6] Egg drop (Research and concept planning)
[7] Egg drop (Design and drawing)
[8] Egg drop (Manufacturing)
[9] Egg drop contest
[10] Paper plane (Lecture on the science of paper plane. Next, actually make a paper plane.)
[11] Paper plane (Lecture of alignment of paper plane. Next, test flight @gymnasium)

[12] Paper plane (Design and make original paper plane by team)
[13] Paper plane contest and summarizing @gymnasium
[14] Prepare for presentation
[15] Final presentation