

TKB213104

Biomedical Engineering Junior Projects
Proyek Junior Teknik Biomedis

BASIC INFORMATION

Course Credit	2 / 100 minutes per Week
Course Type	Required
Course Classification	Engineering Topics
Prerequisites	All Basic Sciences Courses

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Development of Engineering Solution (KP.2)	Data and Experiments (KP.4)
Engineering Design (KP.3)	Modern Tools Utilization (SK.1)

Learning Outcomes

- LO1** Students are able to solve simple engineering problems.
- LO2** Students are able to design simple engineering solutions.
- LO3** Students are able to use modern tools and IT in their works.
- LO4** Students are able to perform simulation.
- LO5** Students are able to perform experiments to acquire data.

COURSE DESCRIPTION

In this project, a series of assignments in the laboratories are compulsory for all students. In total we have 3 mandatory hands on (Oscilloscope and measuring devices tutorial, PCB board soldering, Matlab's hands on), 15 mandatory modules, and 10 elective modules and hands on. In order to access the final assignment, i.e., the projects itself, students have to complete at least 20 (18 compulsory + 2 electives) assignments. The hands on and modules will be running throughout semester 3 and 4 where the students are required to complete them within the specified period. Once completed, groups of students (at most 6) can start the projects. The theme of the projects might change annually. Some sample of the projects are:

1. A boom bass amazing amplifier for your very low frequency voice

2. Energy sensors for wind/microhidro/other kind of renewable energy
3. Using linear algebra to design your first AM radio
4. Table top scale renewable energy harvesting power plant
5. Etc.

TOPICS

Compulsory courses

1. Introduction to engineering design
2. Project management
3. Impact of engineering design
4. How to prepare report and presentation

Compulsory hands on

1. PCB board soldering
2. Matlab/Scilab essential
3. How to use Oscilloscope, digital and analog meters

Electives hands on (guided self-study)

1. Digital Signal Processors (DSP) tutorial
2. Microcontrollers tutorial
3. Fundamental of CAD tutorial
4. How to use search engines effectively
5. LaTeX scientific writing assignment
6. Essential of Microsoft Excel and Word
7. Bibliographic tools such as Zotero and Mendeley
8. And so on.

Compulsory Lab's works

1. Microprocessor Lab's Work (5 compulsory, 2 elective)
2. Fundamentals of Electronics Lab's Work (5 compulsory, 5 elective)

3. Digital Signal Processing Lab's Work (5 compulsory, 2 elective)

REFERENCES

- [1] J. Abarca, A.J. Bedard, D.W. Carlson, L.E. Carlson, J. Hertzberg, B. Louie, J. Milford, R. Reitsma, T. L.Schwartz and J.F. Sullivan, "Introductory Engineering Design: A Projects-Based Approach," Third Edition.
- [2] Alan D. Wilcox, Engineering Design for Electrical Engineers, 1st Edition, Pearson