

# TKB214101

## Capstone Project 2

### Proyek Perancangan Teknik Biomedis 2

#### BASIC INFORMATION

|                              |   |
|------------------------------|---|
| <b>Course Credit</b>         | 3 / 150 minutes per Week                                |
| <b>Course Type</b>           | Required  |
| <b>Course Classification</b> | Engineering Topics                                      |
| <b>Prerequisites</b>         | Junior Projects; Proyek perancangan teknik biomedis s I |

#### STUDENT AND LEARNING OUTCOMES

##### Covered Student Outcomes

|                              |                                |
|------------------------------|--------------------------------|
| Engineering Design (c)       | Data and Experiments (d)       |
| Modern Tools Utilization (e) | Multidisciplinary Teamwork (h) |

##### Learning Outcomes

- LO1** Students are able to design Electrical Engineering solutions given a general problems
- LO2** Students are able to present the idea in adequate level of technical details
- LO3** Students are able to apply modern tools and IT in their works
- LO4** Students are able to design experiments to verify their solutions
- LO5** Students are able to compose a detailed technical report

#### COURSE DESCRIPTION

Compared to Proyek Junior, Senior project is aimed to give further experience for the 3rd students. In this project, students have to be able to design solutions for more difficult problems. The solution should fall within the electrical engineering area (i.e., not interdisciplinary area, see Proyek Perancangan Teknik Elektro for complex interdisciplinary engineering problems). In order to perform the project well, series of assignments in the laboratories are compulsory for all students.

Similar to Proyek Juniors, a series of hands on, lab sessions and tutorial need to be completed. Once completed, the students are eligible to do the project in a group (up to 6 students). The hands on and

lab sessions will be running throughout semester 5 and 6 where the students are required to complete at least 25 assignments within the specified period. The theme of the projects might change annually and harder than Proyek Junior themes. Some sample of the projects are:

1. Voltage stabilizer design challenge
2. Self-energized watering systems with IoT
3. Smart student room with voice control
4. Self balancing two wheeled robot
5. Service robot prototype for high voltage transmission line
6. IoT based smart power meter for your room
7. Etc.

## TOPICS

### **Compulsory courses**

1. Introduction to engineering design 2
2. Project management 2
3. Introduction to DTETI Proyek Perancangan Teknik Biomedis

### **Compulsory hands on**

1. Essential functional electronics
2. How to use Spectrum Analyzer
3. Introduction to NI and Labview

### **Electives hands on (guided self study)**

1. More on Microprocessor/Microcontrollers
2. CAD tutorial
3. LaTeX for Engineers
4. More on Bibliographic Tools
5. More on Matlab/Scilab
6. Programming through Python tutorial
7. Robot Operating Systems (ROS)

8. Advanced softwares (Dspace, EDSA, ETAP, etc).

### **Compulsory Lab's works**

1. Analog Electronics Lab's work (3 compulsory, 3 elective)
2. Control Systems Lab's work (3 compulsory, 3 elective)
3. Electrical Machineries (3 compulsory, 3 elective)
4. High Voltage Lab's work (2 compulsory, 2 electives)
5. Power Systems Lab's work (2 compulsory, 4 electives)
6. Telecommunication Lab's work (4 compulsory, 2 electives)
7. Advanced Electronics Lab's work(2 compulsory, 2 electives)
8. Advanced Signal Processing Lab's work (2 compulsory, 2 electives)

### **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