Introduction to Engineering Project II – 2018.2

COURSE: Introduction to Engineering Project II (IEP II)

TEACHERS: Cel R/1 Vidal, Ten Cel Leila, Maj Aderson, Maj Humberto, Cap Vasconcelos, Cap Ferrari.

WORKLOAD: 60 h

CLASS SCHEDULE: Monday, 13:10h às 16:50h

WORK PLAN

1. Concept

This design-implement course is continuation of *Introduction to Engineering Project I* (IEP I), and also aims to prepare future engineers to deal with the complexities of engineering projects considering their management aspects. In this way, the project management (PM) language, the tools and the context where these tools should be applied will be demonstrated. Additionally, at this course, the students will have the opportunity to plan and execute a real engineering project (suitable for a team of 4th semester engineering students) advised by a teacher.

2. Intended Learning Outcomes of the Course

Prepare future engineers to work with general project management tools, suitable for military and and civilian environments, providing them with the language and tools to develop and organize projects in a professional and modern way.

Specifically, the intended learning outcomes will be:

a) Understand and use the language of project management following the set of good practices PMBOK and NEGAPEB. The latter is the PMBOK-based model constructed and adopted by the Brazilian Army for the standardization of project management documents.

b) Apply the concepts and tools of project management in the construction of a real project plan.

c) Use project management software.

d) Develop team working abilities as well as oral and written communication skills.

3. Teaching/learning Methods

The course is built using <u>constructive alignment</u> and <u>active learning methods</u>. These pedagogical techniques will support teachers to achieve the intended learning outcomes proposed for the course.

3.1. Constructive Alignment

Constructive alignment is a course-preparation technique developed by the Australian professor John Biggs[1]. It proposes that the course preparation should "align" three fundamental factors: a) learning objectives, b) teaching/learning methods and c) assessment.

Considering each specific course, the teacher should be able to define no more than 5 or 6 intended learning outcomes for his/her course, using the *learning verbs* (which reflect the level of learning desired for each subject, according to the Bloom scale). Considering these outcomes, the appropriate teaching/learning methods will be chosen so that these objectives are achieved and, subsequently, the types of assessment capable of attesting the students' level of learning.

3.2 Active Learning Methods

Active learning methods consider that education should be student-centered and not teacher-centered. The student must study/learn and the teacher must organize the course for this. This is a paradigm shift comparing to traditional classes, usually focused on preparing lectures where the teacher explains the subjects and then assess the students' learning.

A foundation that motivates the use of active methods is the William Glasser's[2] learning pyramid. It shows that in situations where the student is <u>*active*</u> in the discussion (discussing, doing or teaching) the rate of learning is much higher than when he is <u>*passive*</u> in this discussion (reading, listening, or observing). In addition to the quality of learning, the quality of classes increases as well, because they become more interesting and less boring.

1a) Biggs, John B; Tang, Catherine. Teaching for quality learning at university. McGraw-Hill Education, 3rd edition, 2017.

b) Biggs, John. "Enhancing iteaching through constructive alignment." Higher education 32.3 (1996): 347-364.

2Glasser, William. "Teoria da escolha: uma nova psicologia de liberdade pessoal." São Paulo: Ed. Mercuryo (2001).

3.3 Course Activities

Following these motivations and principles, this design-implement course provides to the students the opportunity to learn, advised by a teacher, how to manage an engineering project. The literature enphasizes the students' motivation in this kind of course. Another point to highlight is the integration of diverse knowledge in a single project (disiciplinary knowledge + project management + skills development). Following these principles, the sophomores organized themselves into 20 groups and chose themes that were offered by the engineering programs.

4. Schedule

Most of the discipline time will be dedicated to the project itself, with no classes. Assessments will be formatted to allow students to present their projects orally and provide a formal report of the work. In this way, they will have the opportunity to practice these skills. Guidance lectures were given in IEP I to support the preparation for oral presentations. In addition, a rubric of the evaluation (section 7) is provided. Written reports should follow the PM model provided by the Brazilian Army (NEGAPEB).

Class	Date	Activities
1	23 Jul	Course opening and theme offer
2	30 Jul	Theme choice
3	06 Aug	Project work, meetings with advisors
4	13 Aug	Project work, meetings with advisors
5	20 Aug	Project work, meetings with advisors
6	27 Aug	Project work, meetings with advisors
7	03 Sep	First assessment
8	10 Sep	International Lecture
2 weeks of tests (other courses)		
9	01 Oct	Project work, meetings with advisors
10	08 Oct	Project work, meetings with advisors
11	22 Oct	Second assessment
12	29 Oct	Project work, meetings with advisors
13	05 Nov	Project work, meetings with advisors
14	12 Nov	Final presentation
2 weeks of tests (other courses)		
15	10 Dec	Project Exposition

5. Assessments

Assessments will follow the schedule above. However, each assessment will have a different purpose: a) first assessment - intends to evaluate the project planning, b) second assessment - evaluates the progress of the project execution, c) Final presentation - evaluates the project closing.

The assessment procedure will follow a format similar to a scientific conference, taking place on the scheduled dates. The approximately 20 groups will be divided into 4 parts and will be organized in 4 rooms of the Department of Basic Sciences, according to the distribution to be offered later. The following aspects will be assessed at each evaluation:

First assessment:
   • **Project Plan** (using PM software, artifacts learned in IEP I). Students should use NEGAPEB as a model. Other project management software can be used to support the generation of artifacts.

   • **References** of the theme associated with the project. They should follow the typical formats of a scientific literature review and should be attached to the project plan.

Second Assessment:
   • **Presentation of the Groups** (considering presentation techniques learned in IEP I). All groups members must participate in the presentation. Groups should use the rubric (section 7).

   • **Adherence to the Project Plan**

Final Presentation:
   • **Presentation of the Groups** (considering presentation techniques learned in IEP I). All groups members must participate in the presentation. Groups should use the rubric (section 7).
   • **Project closing.**

6. Project Exposition

An exhibit of the projects completed during the course, which will take place after the 2nd week of the IME, is scheduled.

7. Rubric

Evaluation criteria	Grade 10 (Exemplary)	Grade 8 (Competent)	Grade 5 (Developing)	Grade 2 (Poor)
Slide quality (weight 1)	Slides are clear and with only the information needed to get the message, with appropriate font size and type, well-chosen colors, and adequate quantities of pictures.	The slides are well-made, but reasonably express the intended content.	The slides are reasonable and do not well express the intended content	Slides with lots of text, no figures or with inadequate figures, many bullets, badly chosen colors and do not express well the content.
Oral Expression (weight 2)	All elements of the group express themselves clearly, safely, naturally, without addictions and in a coordinated way.	The students made a good presentation, but they are still uncomfortable, with problems in the coordination of speech and/or with few addictions.	Students are expressing themselves poorly, but they show signs of coordination.	The presentation of the members is uncoordinated, with contradictory information and with many addictions.
Problem Understanding (weight 4)	It shows deep/robust problem knowledge with arguments developed completely in its category.	The group shows understanding of the problem, but with little developed arguments.	It shows a superficial understanding of the problem with very poorly developed arguments.	It does not show problem knowledge with fragile arguments and/or contains many errors.
Schedule (weight 3)	The work is following the schedule and apparently it will be possible to complete the project.	The schedule is late, but the group demonstrates the conditions to complete the project on time.	The schedule is late with some probability of finishing the project, or part of it, on time.	The schedule is too late and no project completion perspective.