# NATIONAL UNIVERSITY OF ENGINEERING
# COLLEGE OF INDUSTRIAL AND SYSTEMS ENGINEERING
# SYSTEMS ENGINEERING PROGRAM

## ST236 – SYSTEMS ENGINEERING PROJECT II

### I. GENERAL INFORMATION

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| **CODE** | **:** | ST236 Systems Engineering Project II |
| **SEMESTER** | **:** | 10 |
| **CREDITS** | **:** | 2 |
| **HOURS PER WEEK** | **:** | 4 (Theory–Practice) |
| **PREREQUISITES** | **:** | ST235 235 Systems Engineering Project I |
| **CONDITION** | **:** | Compulsory |
| **DEPARTMENT** | **:** | Systems and Telematics |

### II. COURSE DESCRIPTION

To be awarded the Systems Engineer Professional Title PE, students must complete and defend an engineering project which is developed and completed in two courses: ST235 Systems Engineering Project I and ST236 Systems Engineering Project II. The following steps are considering for completing the project:

1. Formulation of project/research proposal.
2. Development of an engineering prototype implementing the proposed solution.
3. Experimentation and testing (data collection and prototype optimization).
4. Analysis of results and generation of conclusions.
5. Written report and oral defense in front of a specialized jury.

In the second course, ST236 Systems Engineering Project II, students complete the project, complete the development and implementation of the prototype, test and optimize it, verify the fulfillment of design specifications, submit and defend the project report.

### III. COURSE OUTCOMES

At the end of the course, students:

1. Apply scientific research methodologies related to systems engineering.
2. Analyze and diagnostic the problem, and formulate the corresponding theoretical background.
3. Analyze and process information related to the research project.
4. Properly write engineering project reports.
5. Appraise the importance of scientific research for knowledge generation and apply the scientific method.
6. Manage the knowledge and project development
7. Formulate project schedule and budgets.

### IV. LEARNING UNITS

**1. REVISIEW OF PROJECT PROGRESS**

Course agenda / Engineering project / Scientific research / University professional thesis / Revision of project progress in previous course / Elaboration of course working schedule and oral presentation schedules.

**2. RESEARCH PROBLEM. CONSISTENCY MATRIX**

Research problem / Research objectives / Research hypothesis / Consistency matrix / Presentation of project progress report.

**3. THEORETICAL FRAMEWORK**

Theoretical framework / Reference framework / Selection and revision of relevant bibliography / Identification of proper theoretical framework for project development / Bibliography references.

**4. STATISTICAL ANALYSIS, VARIABLES, MEASUREMENTS AND TESTINGS**

Analysis unit / Population and sampling / Independent and dependent variables / Experiment and test design / Data gathering / Data statistical analysis.

**5. PROJECT FINAL ORAL DEFENSE**

Structure of final research project / Structure of final oral presentation / Presentation in front of a jury.

## V. LABORATORY AND PRACTICAL EXPERIENCES

Practice 1. Revision of theoretical framework.
Practice 2. Revision and improvement of solution design.
Practice 3. Solution development. Prototype development.
Report 1. Preliminar project report. Oral defense.
Report 2. Final report. Oral defense.

## VI. METHODOLOGY

The course points to the formulation and development of a final prototype that represents the solution to an engineering problem based on the application of information systems and technologies. The course is developed in a workshop fashion with students working individually and in teams for developing a solution to a problem or need to be satisfied. The instructors revise biweekly the advances of the project and provide advising for the appropriate project development. In the course student identify the problem and develop the solution prototype using proper methodologies, software tools, and engineering norms and standards. At the end of the course, students submit and defend the final report in front of a jury.

## VII. EVALUATION FORMULA

The Final Grade PF is calculated as follows (evaluation system: D):

$$\boldsymbol{PF} = (\boldsymbol{PC1} + \boldsymbol{PC2} + \boldsymbol{PC3} + \boldsymbol{TM1} + \boldsymbol{TM2})/\boldsymbol{5}$$

PC: Graded practice work
TM: Report. Submission and oral defense

## VIII. BIBLIOGRAPHY


1. **HERNANDEZ R., FERNANDEZ C., BAPTISTA P.**
   Research Methodology.
   McGraw Hill Editions, 2012

2. **SHIROTA Tokeshi**
   University Professional Thesis: Planning, Development and Approval.
   University of Lima Editions, 2008.