



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

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**SYLLABUS - GP525 PROJECT DESIGN AND EVALUATION**

**I. GENERAL INFORMATION**

<b>CODE</b>	: GP525
<b>SEMESTER</b>	: 9
<b>CREDITS</b>	: 4
<b>HOURS PER WEEK</b>	: 5 (Theory – Practice)
<b>PREREQUISITES</b>	: GP515 Strategic Planning and Management
<b>CONDITION</b>	: Compulsory
<b>INSTRUCTOR</b>	: Carlos Flores, Ernesto Flores, Daniel Valdivia
<b>INSTRUCTOR E-MAIL</b>	: eflorescisneros@yahoo.com

**II. COURSE DESCRIPTION**

In this course students complete the design and evaluation of an industrial engineering project taking into account market, technical, technology, administration and economic issues in an integrated scheme. Students work in teams to sequentially complete each step of the project. At the end of the semester each student team submit and defend the project report in front of a jury.

**III. COURSE OUTCOMES**

1. Collect and organize relevant information regarding market, organization, technology and economic required for evaluating the feasibility of an engineering project.
2. Carry out and complete market research process and compute relevant statistical results.
3. Propose product and services to satisfy market needs and demands.
4. Use statistical models to predict the apparent demand for the product or service to be offered.
5. Design products or services detailing and specifying their technical characteristics and attributes to satisfy user demands and expectations.
6. Determine the required equipment, instruments and material for constructing the designed product.
7. Identify the plant location and propose a plant layout taking into account transport costs and ranking of factors.
8. Evaluate the economic feasibility of the project using financial indexes such as net present value, internal return rate, benefit/cost ratio and repayment period.
9. Assess the environmental impact of the project.

**IV. LEARNING UNITS**

**1. ENGINEERING PROJECTS / 5 HOURS**

Objectives and goals of the project / Development steps / Types of projects / Elements of a project.

**2. MARKET AND DEMAND ANALYSIS WITH PRIMARY INFORMATION / 5 HOURS**

The product or service to produce and sell / Market geographic area / Demand analysis / Market research / Surveys and statistical analysis / Prediction of potential demand

**3. DEMAND ANALYSIS WITH SECONDARY INFORMATION / 5 HOURS**

Apparent demand / Prediction and forecasting / Regression models /MAE as regression technique / Demand elasticity.

**4. SUPPLY ANALYSIS / 5 HOURS**

Supply analysis / Providers / Demand-Supply balance / Price and sale policies / Distribution channels / Marketing and publicity.

**5. TECHNICAL ISSUES: SIZE / 5 HOURS**

Size measures / Maximum and real capacities / Minimum size / Size limitations / Optimun size / Economies of scale / Learning curve / Decision trees.

**6. TECHNICAL ISSUE: LOCATION / 10 HOURS**

Qualitative and quantitative factors / Macro location and micro location / Transport costs / Factors ranking and evaluation.

**7. TECHNICAL ISSUE: ENGINEERING / 15 HOURS**

Product technical specifications / Production processes and types / Equipment and machines requirements / Materials and personnel requirements / Plant layout / Quality control / Production program and planning / Economies of scale.

**8. ORGANIZATION AND ADMINISTRATION/ 5 HOURS**

Legal feasibility / Corporate forms / Brand register / Licensing / Taxing / Organigram / Functions manual / Mission and vision.

**9. INVESMENT AND FINANCING / 5 HOURS**

Investment structure / Tangible and intangible assets / Working capital / Stocks / Depreciation / Investment program / Internal and external financial sources / Debt repayment.

**10. PROJECTED BUDGET / 5 HOURS**

Incomes and expenses / Fabrication costs / Operation costs / Fix and variable costs.

**11. PROJECTED FINANCIAL STATEMENTS / 5 HOURS**

Importance and meaning / Projected gains and losses statements / Projected cash flow / Projected general balance.

**12. FINANCIAL EVALUATION / 5 HOURS**

Assessment ratios / Discount rate / Net present value / Internal return rate / Benefit-Cost rate / Repayment term / Financial leveraging / Sensibility analysis.

**13. ENVIRONMENTAL IMPACT ASSESSMENT / 5 HOURS**

Ecology and environment / Environmental impact / Norms and regulations / Evaluation of environmental impact / Environmental auditing.

**VI. METHODOLOGY**

In this course students complete the capstone project. The instructor presents the steps of the project students should complete sequentially along the academic semester. At the beginning, students form groups (4 to 5

students each) and define the product or service to produce and sell. At the end of the semester each student team submit and defend the project report in front of a jury. Best projects are selected to be presented in the Student Project Contest held at the end of the academic semester.

#### **VIII. BIBLIOGRAPHY**

1. **CEPAL / AAT**  
Manual of Economic Development Projects  
United Nations (2005)
2. **FONTAINE, ERNESTO**  
Project Evaluation  
Alfa Omega Editorial (2003)
3. **MORALES, ARTURO AND MORALES JOSE**  
Investment Projects  
McGraw Hill Editorial (2009)