



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS
ENGINEERING
TELECOMMUNICATIONS ENGINEERING PROGRAM

SYLLABUS - IT556 COMMUNICATION NETWORK PLANNING

I. GENERAL INFORMATION

CODE	: IT556
SEMESTER	: 10
CREDITS	: 3
HOURS PER WEEK	: 4 (Theory – Practice)
PREREQUISITES	: IT524 Computer Networks
CONDITION	: Compulsory
INSTRUCTOR	: Paul Troncoso,

II. COURSE DESCRIPTION

In this course students develop the skills for the planning of telecommunications networks typical of providers of telecommunications services. The planning does not only considers technology issues but it also includes diverse aspects such as demand, market size and conditions, investments, economic incomes and expenses, economic value, business model, business sustainability and so on. In this course, students complete the capstone project presenting the complete solution to a real-world telecommunication networks planning.

III. COURSE OUTCOMES

1. Understand the components of the process of telecomm network planning.
2. Estimate the demand for telecommunication services: telephony, data, interactive services.
3. Select proper telecommunication technologies according to the particular application.
4. Determine, describe and specify all technology component of a telecommunication network.
5. Determine the incomes and expenses of a telecommunication project and compute and compare profitability measures.
6. Present technical reports detailing the technical and economic aspect of the project.

IV. LEARNING UNITS

1. PLANNING PROCESS

Planning management / Strategy of a telecomm services provider / Basic tool for analyzing the feasibility of an investment project / Business plan: financial mathematics / analysis and interpretation of results.

2. TECHNOLOGY: SERVICES AND INVESTMENTS

Technology requirements / Network architectures and associated technologies / Transmitted signal characterization / Network elements / Basic rules for network design / Services supply

over distribution network: telephony, data, interactive services / Technology alternatives according to offered services / Technology impact on operator business plan.

3. MARKET: INCOMES AND COSTS

Telecommunication services market / Services price fixing / Price theory: demand elasticity, costs based pricing, tariff comparison / Direct costs associated to telecomm services: programming costs, interconnection costs / Functional organization of telecomm operator / Market impact on operator business plan.

4. ECONOMIC VALUATION

Business model / Service quality models / Projection of incomes and expenses / Profitability measures.

5. NETWORK PLANNING

Fundamental technical planning / Numbering / Routing / Switching planning and associated costs / Transmission plan / Signalling / Planning and design of lines network / Subscriber plant / Distribution network design / Network deployment / Institutional and corporate networks.

6. CAPSTONE PROJECT

Complete the capstone project along the academic semester.

VI. METHODOLOGY

In this course the students work in teams to complete the capstone project. The instructor presents the concepts and methodologies of each design aspect including technology, market and business model issues. Along the academic semester students make partial presentation of the project and at the end of the semester each team submits and defends the design report. Best projects are selected to participate in the Student Project Contest.

VII. EVALUATION FORMULA

The average grade PF is calculated as follows:

$$PF = (PP1 + PP2 + PP3 + 5*FP) / 8$$

PP#: Partial presentation

FP. Final presentation

VIII. BIBLIOGRAPHY

1. **CCITT, ITU**
National Telephone Networks for Automatic Services
Geneve, Swiss, 2010.
2. **HORWARD W. SAMS**
Reference Data for Radio Engineers
International Telephone and Telegraphs ITT, 2005
3. **SCHKOLNICK, RAUL**
The Economics of Telephone Networks.
Interamerican Development Bank, Washington, 2000.