



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF INDUSTRIAL AND SYSTEMS ENGINEERING

SYSTEMS ENGINEERING PROGRAM

ST205 – Special Topics in Systems Engineering

I. GENERAL INFORMATION

CODE	: ST205 – Special Topics in Systems Engineering
SEMESTER	: 9
CREDITS	: 02
HOURS PER WEEK	: 04 (Theory – Practice)
PREREQUISITES	: ST204 - Software Engineering Workshop I
CONDITION	: Mandatory

II. COURSE DESCRIPTION

This course focuses on the frameworks of Business Architectures based on ICT, because these allow defining and identifying the components and relationships that make up an IT architecture for any organization; Knowing the reference models for Business Architectures, effective management and governance for these technologies in organizations can be considered. In addition, it presents the study of various topics in systems engineering that serve to build a modern business architecture such as business intelligence, data mining, big data, analytics, business process management, among others; These topics are chosen and exposed by students in groups, using scientific research methodologies.

III. COURSE OUTCOMES

At the end of the course the students will:

- Understand ICT as generating competitive advantages and aligned with business strategies, and IT Business Architectures as a planning tool for better design and execution of ICT management in organizations.
- Recognize the importance of Strategic Information Planning in terms of the business model aligned with the company's Strategic Plan.
- Understand the definition, development and implementation of IT Business Architectures.
- Learn about the activities to define an IT Architecture using the TOGAF framework.
- Research systems engineering topics that are part of an IT Business Architecture (business intelligence, process management, new approaches such as big data, among others).
- Develop a report with the literature review about the topics investigated.
- Express the result and conclusions of your report orally, in writing, and graphically, with a bonus if you do so in English.
- Participate and work in a group research and presentation of your report on the topics investigated.

IV. LEARNING UNITS

1. INFORMATION TECHNOLOGY MANAGEMENT

Critical Thinking / Characteristics of good critical thinking / Elements of critical reasoning / Attributes of the critical thinker / Information Technology Management / Concepts, positioning in the company, fields of action, business orientation, key aspects, IT management model / New trends in business and business.

2. IT – ALIGNMENT WITH THE COMPANY

Henderson-Venkatraman alignment model, internal and external domain / Strategic adjustment and functional integration, alignment perspectives, alignment dynamics / Business and IT alignment concepts.

3. IT – STRATEGIC PLANNING

Deliverables and benefits of PEI / Vision, mission, objectives and initiatives / Analysis of current situation, internal and external aspects, SWOT Matrix, Business Strategies / Panoramic model of the company: Organizational Units, Macroprocesses, Data Entities and Locations / Analysis of Goals and Problems / Organization of the goals / Problems, relationship between goals and problems / Analysis of Critical Success Factors / Concepts, types, classification, importance, organization of FCE, critical assumptions, critical information, critical decisions / Technological Impact Analysis / Concepts, business opportunities, technological changes, competitive threats / Matrix Opportunities vs. Technological Changes / Strategic Vision of Systems / Critical mission systems, aspects of competitive differentiation / Legacy systems or legacies.

4. IT – ENTERPRISE ARCHITECTURES, MARCO TOGAF

Business Architecture / Business perspectives, principles / Need and benefits of a business architecture / Architecture frameworks known as Zachmann and others / TOGAF Architecture Framework, business concept / Types of Architectures in TOGAF / Components of the TOGAF framework, content and relationship between them, relationship with other business architecture frameworks.

5. VISION OF BUSINESS ARCHITECTURE AND BUSINESS ARCHITECTURE

Principles of IT Architecture / Architecture Vision, scope, requirements and Business Scenarios / Business Architecture, components and deliverables / Views in IT Architectures / Business Process Management (BPM) / Process models, BPMN notation.

6. DATA ARCHITECTURE AND APPLICATIONS, INTEGRATION OF APPLICATIONS, BUSINESS INTELLIGENCE

Data Architecture / Entity – Relationship Diagram / Process Matrix – Entity / Application Architecture / Application Group Integration / Electronic Business Architecture CRM, ERP / Business Intelligence, data mining, analytics, big data.

7. TOGAF TECHNICAL REFERENCE MODELS (TRM and III-RM), TECHNOLOGICAL ARCHITECTURE

Technical Reference Model-TRM, concepts, components / Detailed model: entities and interfaces, categories of software services / Integrated Information and Infrastructure Reference Model (III-RM), basic concepts, inter-company information flows, model components / Detailed model: business applications and infrastructure / Technological Architecture / Definition of the base technology and the target technology / Steps for the development of the target technology.

8. SOA AND BUSINESS ARCHITECTURE

Service Oriented Architecture / Application in the company / Relationship with other styles of business architecture / Six-layer OASIS Architecture / SOA Governance Framework / Service Implementation.

V. METHODOLOGY

In the development of the course, the research techniques and the individual and group exposition techniques are combined. The course will be developed through theoretical presentations by the teacher, and the students will make literature review reports for topics such as business architecture, business intelligence, process management or other related topics, reading the material, participating in class and presenting practical works. In all the sessions the active participation of the student is promoted, as well as the use of the English language.

VI. EVALUATION FORMULA

The learning will be evaluated through the "I" system.

- Partial Exam (PE): Weight 1
- Final Exam (FE): Weight 2
- Average of Practices (P): Weight 1.

$$FA = \frac{PE + 2 * FE + 1}{4}$$

VII. BIBLIOGRAPHY

- KALAKOTA, Ravi and ROBINSON, Marcia. From e-commerce to e-business. Addison-Wesley, 2001
- The Open Group TOGAF version 9.1 Enterprise Edition. The Open Group, 2010
- The Open Group Service-Oriented Architecture. The Open Group SOA Working Group, 2007
- TEJADA, Miguel. Course separators. 2015