NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ECONOMICS AND STATISTICAL ENGINEERING

STATISTICAL ENGINEERING PROGRAM

EC824 – SYSTEMS DESIGN AND ANALYSIS

I. GENERAL INFORMATION

CODE   **:** EC824 Systems Design and Analysis
SEMESTER   **:** 9-10
CREDITS   **:** 3
HOURS PER WEEK **:** 4 (Theory – Practice)
PREREQUISITES   **:** EC724 Data Base II
CONDITION   **:** Elective

II. COURSE DESCRIPTION

This course train the students in the application of concepts, methods and modern techniques of information systems design which allow the efficient and professional use of the resources available in the enterprises so that the information system can meet the requirements of it. This course encourages the group and research work through the elaboration of a project that must be held by students throughout the semester.

III. COURSE OUTCOMES

1. Review of the management principles of iterative, evolutionary and dynamic systems projects.
2. Understanding of a conception phase.
3. Understanding of an elaboration phase, the domain model and the definition of the preliminary architecture.
4. Refine the domain model for designing adequately the proposed solution.
5. Use the design patterns and other techniques that provide maintenance ease.
6. Understand and design the state transition diagram.
7. Adequately identify and define relationships among objects corresponding to the application design.
8. Identify and define the operation propagation of the application components.
9. Organize the implementation model package and the displacement diagram of the application design.
10. Develop a project using the evolutionary approach. This iteration corresponds to the second and third iteration of the elaboration phase.
11. Understanding of the architecture, identification of the sub-systems and the persistence model with patterns.
12. Integrate computer solutions for solving real cases.
13. Carry out development works of computer projects with state-of-the-art tools.
14. Carry out a research about subjects related to software development.
15. Encourage the group and individual work.

IV. LEARNING UNITS
1. REFINING THE DOMAIN MODEL / 7 HOURS
Domain model building / Refining the model adding several types of associations.
2. GANG OF FOUR PATTERNS / 21 HOURS
Creational patterns: Abstract factory, Virtual Builder, Factory Method / Structure patterns: Adapter, facade, Proxy / Behavior patterns: Observer, Template Method.

3. MODELING THE BEHAVIOR WITH STATE TRANSITION DIAGRAMS / 7 HOURS
Elaboration (Iteration 1) / Definition of the state transition diagrams.
4. MODELING THE GENERALIZATION / 14 HOURS
Generalization concepts / Association / Addition / Operation propagation.
5. DESIGNING THE ARCHITECTURE WITH PATTERNS / 14 HOURS
Elaboration (Iteration 3) / Sub-system identification / Definition of persistence / Management of errors and exceptions / Associations.
6. ORGANIZING THE IMPLEMENTATION MODEL AND DOMAIN DESIGN MODEL PACKAGES
Representation of the components: Implementation diagram / Representation of the physical environment: displacement diagram.
7. DESIGNING THE PERSISTENCE FRAMEWORK WITH PATTERNS / 14 HOURS
Considerations for the persistence framework with patterns / Persistence framework design with patterns (Study case).

V. LABORATORIES AND PRACTICAL EXPERIENCES:
Refinement of the domain model with Rational Rose
Use of Requisite Pro
Quiz 1: Rational Rose and Requisite Pro
State transition diagram with Rational Rose
Exposition of the first project deliverable
Evolution of the types diagram with Rational Rose
Quiz 2: rational Rose
Persistence Model with rational Rose
Distribution and implementation diagram with rational rose
Exposition of the second project deliverable

VI. METHODOLOGY
The course is carried out in theory, practical and lab sessions. In theory sessions, the instructor introduces concepts and applications. In practical sessions, several problems are solved and their solutions are analyzed. In lab sessions, problems are proposed and solved using state-of-the-art software tools. During this course, students must hand in and expose a group work. In all sessions, students' active participation is encouraged.

VII. EVALUATION FORMULA
The average grade PF is calculated as follows:

$$PF = 0.25\ EP + 0.25\ EF + 0.10\ CL + 0.15\ PC + 0.25\ TG$$

EP: Mid-Term Exam	EF: Final Exam	TG: Group work
PC: Quizzes	CL: Reading control	

VIII. BIBLIOGRAPHY

1. **LARMAN, CRAIG**
   Applying UML and Patterns – 3rd Edition
   Editorial Pearson Education, INC., 2005

2. **GAMMA, ERICH AND HELM, RICHARD AND JOHNSON, RALPH AND VISSIDES, JOHN**
   Design patterns (Spanish)
   Addison Wesley, 2003

3. **RUMBAUGH, JAMES AND OTHERS**
   Object-oriented Modeling and Design
   Prentice Hall, Inc., 1991