ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
Faculty of Electrical and Computer Engineering
COURSE SYLLABUS
Research Methods Applied to Computing

1. CODE AND NUMBER OF CREDITS

CODE	FIEC06437	
NUMBER OF CREDITS: 4	**Theoretical: 4**	**Practical: 0**

2. COURSE DESCRIPTION

This course introduces the fundamental concepts of research methods applied to any science, but in particular to computer science. It also seeks to review the main applications of these methods in computing research. The course includes important components of a written research paper, major models of experimental design, quasi-experimental designs, and quantitative research. A review of ways to perform data analysis through descriptive and inferential statistics, linked to research performed by students, is also included.

3. PRE-REQUISITES AND CO-REQUISITES

PRE-REQUISITES	ICM00166 STATISTICS
CO-REQUISITES	FIEC05553 DATABASE SYSTEMS I

4. CORE TEXT AND OTHER REQUIRED REFERENCES FOR THE TEACHING OF THE COURSE

CORE TEXT	1. Hernández, R., Fernández, C. & Baptista, P. Metodología de la Investigación. Quinta edición, 2010. Mc Graw Hill.
REFERENCES	1. Jackson, S. L. (2011)Research methods and statistics: A critical thinking approach. Cengage Learning; Fourth Edition.

5. COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to:

1. Design a quantitative research, as part of a group, based on a literature review and select a research problem, considering social, ethical and legal issues.
2. Analyze research results, through the use of descriptive and inferential statistics and statistical packages that support this analysis.
3. Communicate the results of a research problem in both oral and written form.

6. COURSE PROGRAM.

I. INTRODUCTION (3 sessions –6 hours)
- The systematic process of research
- Validity in research
- Reliability in research
- Research methods
- Activities in the research process
- Types of Research
- Types of quantitative research

II. IDENTIFYING A RESEARCH PROBLEM (4 sessions – 8 hours)
- Selection of a problem
- Stating a problem
- Variables, hypothesis, ways of stating a hypothesis

III. LITERATURE REVIEW (3 sessions – 6 hours)
- Activities of the literature review
- Sources of information
- Summarizing an assembling information
- Interpreting and using information

IV. QUANTITATIVE RESEARCH DESIGN (1 session – 2 hours)
- Purposes of research design

- Concepts to control variance
- Characteristics of a good research design

V. EXPERIMENTAL DESIGNS (4 sessions – 8 hours)
- The meaning of experimental design
- Criteria for a good experimental research design
- Types of designs post-test, pre-test, Solomon Design
- Factorial designs
- Repeated measures
- Designs extended on time
- Interpreting results of experiments
- Randomness and representativeness

VI. QUASI EXPERIMENTAL DESIGNS (1 session – 2 hours)
- Validity problems
- Post-test, Non-equivalent control groups design
- Pre-test, Non-equivalent control groups design
- Time series design

VII. SURVEY BASED RESEARCH (2 sessions – 4 hours)
- Methodology followed in a survey based research
- Questionnaires
- Interviews
- Analyzing and reporting results

VIII. SAMPLE DESIGN (2 sessions – 4 hours)
- Random samples
- Criteria for designing samples
- Probabilistic sampling: simple and stratified
- Systematic probabilistic sampling
- Non-probabilistic sampling

IX. DATA ANALYSIS (5 sessions – 10 hours)
- Using the computer for data analysis
- Testing hypothesis
- Correlational analysis
- Parametric Analysis
- Non-parametric Analysis

X. COMMUNICATING RESEARCH (3 sessions – 6 hours)
- Main sections of a research proposal
- Main sections or a research report
- Other sections of a research report
- Guidelines for presenting articles in conferences

7. WORKLOAD: THEORY/PRACTICE

Two sessions per week, 2 hours per session

8. CONTRIBUTION OF THE COURSE TO THE EDUCATION OF THE STUDENT

Students conduct a research design that is evaluated according to the knowledge developed by them in the statistics course previously taken. Students learn the basic fundamentals of research design and apply them to the design of a research and analysis of the results. Students review quasi-experimental and experimental designs that reinforce what they have learned in previous courses that are entirely oriented to science learning.

BASIC TRAINING	PROFESSIONAL TRAINING	SOCIAL SKILLS DEVELOPMENT
	x	

9. THE RELATIONSHIP BETWEEN THE LEARNING OUTCOMES OF THE COURSE AND THE LEARNING OUTCOMES OF THE DEGREE PROGRAM

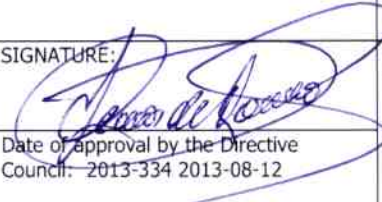| LEARNING OUTCOMES OF THE DEGREE PROGRAM*	CONTRIBUTION (High, Medium, Low)	LEARNING OUTCOMES OF THE COURSE**	THE STUDENT MUST:
a) An ability to apply knowledge of computing and mathematics appropriate to the discipline	Medium	2	Use knowledge related to inferential statistics and descriptive data analysis
b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution	High	1, 2	Define a research problem
c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	Medium	1	Do a research design associated with a problem
d) An ability to function effectively on teams to accomplish a common goal	Low	1	Work on a project as part of a group
e) An understanding of professional, ethical, legal, security and social issues and responsibilities	Medium	1	When posing the research design, ethical, legal and social conditions must be considered
f) An ability to communicate effectively with a range of audiences	Medium	3	Develop a written article and present orally the results achieved in their research
g) An ability to analyze the local and global impact of computing on individuals, organizations, and society	Low	1	When making the design and analysis of research, students should consider the local impact of their activities.
h) Recognition of the need for and an ability to engage in continuing professional development	Medium	1, 3	Do a literature review associated with various topics related to their research and others, and consequently, reflect on the need to keep improving their skills.
i) An ability to use current techniques, skills, and tools necessary for computing practice.	Medium	1	Use a statistical package that allows them to use their knowledge of algorithms and programming languages.
j) Ability to lead, manage and undertake projects.			

10. EVALUATION IN THE COURSE

Evaluation activities	
Exams	X
Tests	X
Homework/tasks	X
Projects	X
Laboratory/Experiments	
Class participation	X
Visits	
Other	

11. PERSON RESPONSIBLE FOR THE CREATION OF THE SYLLABUS AND THE DATE OF ITS CREATION

Created by	Katherine Chiluiza García
Date	April 19, 2013

12. APPROVAL

ACADEMIC SECRETARY OF THE ACADEMIC DEPARTMENT	DIRECTOR OF TECHNICAL ACADEMIC SECRETARY
NAME: Sra. Leonor Caicedo G.	NAME: Ing. Marcos Mendoza V.
SIGNATURE:	SIGNATURE: ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL
Date of approval by the Directive Council: 2013-334 2013-08-12	Ing. Marcos Mendoza V. DIRECTOR DE LA SECRETARIA TÉCNICA ACADEMICA

13. VALIDITY OF THE SYLLABUS

RESOLUTION OF THE POLYTECHNIC BOARD:	13-10-269
DATE:	2013-10-17