University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Electrical and Computer Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: CIIC 6005
Course Title: Foundations of Computing
Number of credits: 3
Contact Period: 3 hours of lecture per week

2. Course Description:

English: Formal concepts and definition of problems solvable by algorithms. Problem classification in terms of time and space required for computing their solution.

Spanish: Conceptos formales y definición de problemas solucionables mediante algoritmos. Clasificación de problemas en términos del tiempo y espacio requerido para la computación de sus soluciones.

3. Pre/Co-requisites and other requirements:

Pre-requisite: Permission of Department Director

4. Course Objectives:

To introduce students with a background in Sciences, Engineering or Mathematics to basic principles pertaining to the modeling and analysis of computational problems and their solutions.

5. Instructional Strategies:

☒conference ☐discussion computation ☐laboratory
☐seminar with formal presentation ☐seminar without formal presentation ☐workshop
☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring
☐research ☐other, please specify:

6. Minimum or Required Resources Available:

Conference room with overhead projector

7. Course time frame and thematic outline

Outline	**Contact Hours**
Preliminaries: a. Review of set theory and Boolean logics b. Proof methods	3
Representation of information: a. Alphabets, strings and encodings b. Languages and operations on languages	3
The string generation problem: a. Regular operations, regular expressions and regular languages b. context-free grammars and context-free languages c. context-dependent grammars and their generated languages	8
The string recognition problem: a. Discrete systems and their modeling as automata b. Finite state automata and the recognition of regular languages c. Pushdown automata and the recognition of context-free languages d. Turing machines and Turing-recognizable languages	12
Computability: a. Decidable languages and the Halting problem b. Reducible problems	6
Complexity: a. Time complexity; polynomial time reducibility b. Class P, Class NP and NP-completeness. Theorem of Cook-Levin c. Space complexity: Savitch's Theorem d. The class PSPACE	12
Exams	1
Total hours: (equivalent to contact period)	45

8. Grading System

☒Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
Assignments	**6 – 8**	**75%**
Final Exam	**1**	**25%**
TOTAL:		**100%**

Conversion table:

Weighted Average Grade	Grade
Less than 53	**F**
53 – 64	**D**
65 – 76	**C**
77 – 88	**B**
89 – 100	**A**

Bibliography:

1. Michael Sipser, "Introduction to the Theory of Computation", Second Edition, Course Technology, 2005
2. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Third Edition, Addison Wesley, 2006
3. Dexter Kozen, "Theory of Computation", First Edition, Springer, 2006
4. Zohar Manna, "Mathematical Theory of Computation", Dover Publications, 2003

10. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

11. Course Outcomes

1. Demonstrate formally some fundamental results in Theory of Computation;
2. Derive minor variants of these results; and
3. Use basic concepts and results in the Theory of Computation to model and analyze computational problems and their solutions

12. Additional information

Instructor: Jaime Seguel
Office room: Stefani 513 - UPRM
Office phone: 1-787-832-4040 extension 3523
Office hours: Monday 10:30 am – 12:00 am, Tuesday 1:00 – 2:30 pm

Course website: http://ece.uprm.edu/~jseguel/CIIC6005.html