

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

<b>1. General Information:</b>	
Alpha-numeric codification: CIIC 6005 Course Title: Foundations of Computing Number of credits: 3 Contact Period: 3 hours of lecture per week	
<b>2. Course Description:</b>	
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.	
<b>3. Pre/Co-requisites and other requirements:</b>	
Pre-requisite: Permission of Department Director	
<b>4. Course Objectives:</b>	
To introduce students with a background in Sciences, Engineering or Mathematics to some of the basic principles pertaining to the modeling and analysis of computational problems and their solutions.	
<b>5. Instructional Strategies:</b>	
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion computation <input type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input type="checkbox"/> other, please specify:	
<b>6. Minimum or Required Resources Available:</b>	
Conference room with overhead projector	
<b>7. Course time frame and thematic outline</b>	
<b>Outline</b>	<b>Contact Hours</b>
<i>Preliminaries:</i> a. Review of set theory and Boolean logics b. Proof methods	4
<i>Representation of information:</i> a. Alphabets, strings and encodings b. Languages and operations on languages	2
<i>The string generation problem:</i> a. Regular operations, regular expressions and regular languages b. context-free grammars and context-free languages c. context-dependent grammars and their generated languages	10
<i>The string recognition problem:</i> 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
<i>Computability:</i> a. Decidable languages b. The Halting problem and undecidable languages	4
<i>Complexity:</i> a. Measuring 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
<b>Total hours: (equivalent to contact period)</b>	<b>45</b>

**8. Grading System** Quantifiable (letters)  Not Quantifiable**9. Evaluation Strategies**

	Quantity	Percent
<b>Assignments</b>	<b>6 - 8</b>	<b>75%</b>
<b>Final Exam</b>	<b>1</b>	<b>25%</b>
<b>TOTAL:</b>		<b>100%</b>

**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 10:00 am – 12:00 am, and 1:00 pm – 3:30 pm

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