CIIC 5045 - Course Syllabus

1. **General Information:**

   Alpha-numeric codification: CIIC 5045
   Course Title: Automata and Formal Languages
   Number of credits: 3
   Contact Period: 3 hours of lecture per week

2. **Course Description:**

   English: Study of theoretical computational models, languages, and machines. Introduction to the theory of intractable and undecidable problems. Topics include: finite automata, regular languages, context-free languages, pushdown automata, Turing machine, halting problem, undecidability, and intractable problems.

   Spanish: Estudio de la teoría sobre modelos computacionales, lenguajes, y máquinas. Introducción a la teoría de problemas intratables y no computables. Temas incluidos: autómatas finitos, lenguajes regulares, lenguajes libres de contexto, autómatas de tipo "pushdown", maquinas de Turing, problema de convergencia, problemas no computables e intratables.

3. **Pre/Co-requisites and other requirements:**

   Prerequisites: CIIC 4020 or ICOM 4035 or authorization of the Director of the Department

4. **Course Objectives:**

   Students will study the fundamental aspects of the theoretical models for computers, and computational processes. Students will also learn to make mathematical proofs to determine if a computational process will halt on a given input.

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:**

   Students will use the Departmental computer laboratories to complete course projects.

7. **Course time frame and thematic outline**

Outline	Contact Hours
Finite Automata	10
Regular Languages	10
Context-Free Languages	5
Push-down Automata	5
Turing Machines and the Halting Problem	7
Dealing with intractability	5
Exams	3
Total hours: (equivalent to contact period)	45

8. **Grading System**

☒Quantifiable (letters) ☐ Not Quantifiable

9. **Evaluation Strategies**

	Quantity	Percent
☒ **Exams**	**3**	**50%**
☒ **Final Exam**	**1**	**25%**
☒ **Short Quizzes**	**[5-10]**	**10%**
☐**Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☐ **Projects**		
☐**Journals**		
☒**Other, specify: Homeworks**	**[3-8]**	**15%**
TOTAL:		**100%**

10. **Bibliography:**

1. Michael Sipser, *Introduction to the Theory of Computation*, 3rd ed., Cengage Learning, 2012.
2. George Tourlakis, *Theory of Computation,* Wiley, 2012.
3. John Martin, *Introduction to Languages and the Theory of Computation*, 4th ed., McGraw-Hill, 2010.
4. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, 3rd ed., Addison-Wesley, 2007.[Classic Book]
5. Peter Linz, *An Introduction to Formal Language and Automata*, 4th ed., Jones & Bartlett, 2012. [Available at the Circulation Collection (QA267.3 .L56 2012), UPRM General Library]

11. Course Outcomes

Upon successful completion of this course, the student will be able to:	Program Student Outcomes Impacted
1. discuss mathematical models of computation	1
2. prove basic theoretical statements of the theory of computation	1
3. discuss the concepts of decidability, computability and their applications	1, 8
4. classify problems according to their computational complexity	1, 8

12. 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 (Office #4) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

13. Academic Integrity

-The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.⸺