**CIIC 5029 - Course Syllabus**

1. **General Information:**

   Alpha-numeric codification: CIIC 5029
   Course Title: Compilers Development
   Number of credits: 3
   Contact Period:  two hours of lecture and three hours of laboratory per week.

   Equivalent Course: ICOM 4029

2. **Course Description:**

   **English**: Study and application of techniques associated with the analysis of source languages and the generation of efficient object codes with emphasis on the components of a compiler.

   **Spanish**: Estudio y aplicación de técnicas asociadas al análisis de los lenguajes fuente y la generación de objetos de códigos eficientes con énfasis en los componentes de un compilador.

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

   Prerequisites: CIIC 4082 or INEL 4206
   Corequisites: CIIC 4030 or ICOM 4036

4. **Course Objectives:**

   Students will learn the techniques involved in the analysis of source languages and the generation of efficient object codes with emphasis on a project designed to build the components of a compiler.

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 |
   | --- | --- |

| | |
|---|---|
| Introduction and structure of a basic compiler | 2 |
| Lexical analysis and the lexical analyzer lex | 2 |
| Trees (especially search trees) | 2 |
| Parsing techniques and context-free grammars | 3 |
| LL parsing | 3 |
| Operator-precedence grammars | 3 |
| LR and LALR parsing and the parser generator yacc | 3 |
| Syntax-directed translation | 3 |
| Intermediate and target code generation | 3 |
| Object file formats and optimization` | 3 |
| Exams | 3 |
| Laboratory | 15 |
| **Total hours:  (equivalent to contact period)** | 45 |

8.  **Grading System**

⊠Quantifiable (letters) ☐ Not Quantifiable

9.  **Evaluation Strategies**

| | Quantity | Percent |
|---|---|---|
| ⊠ **Exams** | 2 | 25% |
| ⊠ **Final Exam** | 1 | 25% |
| ☐ **Short Quizzes** | | |
| ⊠**Oral Reports** | 3 | 25% |
| ☐ **Monographies** | | |
| ☐ **Portfolio** | | |
| ⊠ **Projects** | 2-4 | 25% |
| ☐**Journals** | | |
| ☐**Other, specify:** | | |
| **TOTAL:** | | **100%** |

10. **Bibliography:**

1. Keith Cooper and Linda Torczon, *Engineering a Compiler*, 2nd ed., Morgan Kaufmann, 2011.
2. Dick Grune, Kees van Reeuwijk, Henri E. Bal and Ceriel J.H. Jacobs, *Modern Compiler Design*, Springer, 2012.
3. Reinhard Wilhelm and Helmut Seidl, *Compiler Design: Virtual Machines,* Springer, 2010.
4. Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman*, Compilers: Principles, Techniques, and Tools,* 2nd ed., Addison-Wesley, 2006. [Classic Book]

## 11. Course Outcomes

| Upon completion of this course the student will be able to: | Program Student Outcomes Impacted |
|---|---|
| 1. specify the lexical structure of a modern programming language using regular expressions or equivalent formalism | 5 |
| 2. specify the syntactic structure of a modern programming language using both LL and LR context-free grammars | 5 |
| 3. specify the static semantics of a modern programming language using attribute grammars, inference rules or similar formalism | 5 |
| 4. understand and apply alternative algorithms and data structures for the implementation of all the basics phases of a compiler; lexical analysis, syntactic analysis, semantic analysis, code generation, and code optimization | 5 |
| 5. work in a team to implement a fully-functional compiler translating a modern programming language into a target language resembling some modern computer architecture | 5, 6 |

## 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.—