CIIC 4025 - Course Syllabus

1. General Information:

Alpha-numeric codification: CIIC 4025
Course Title: Analysis and Design of Algorithms
Number of credits: 3
Contact Period: 3 hours of lecture per week

Equivalent Course: ICOM 4038

2. Course Description:

English: Study of methods and techniques for the complexity analysis of computer algorithms. Design of new algorithms capable of minimizing execution time while optimizing the use of computer resources. Topics include: asymptotic analysis, greedy strategies, divide and conquer, dynamic programming, backtracking, and graph, search, and sorting algorithms**.**

Spanish: Estudio de métodos y técnicas para el análisis de la complejidad de algoritmos computacionales. Diseño de nuevos algoritmos capaces de minimizar el tiempo de ejecución y optimizar el uso de recursos computacionales. Los temas incluyen: análisis asintótico, estrategias ambiciosas, división y conquista, programación dinámica, "backtracking" y algoritmos de grafos, búsqueda y ordenamiento.

3. Pre/Co-requisites and other requirements:

Prerequisites: CIIC 4020 or ICOM 4035

4. Course Objectives:

Students will learn the techniques to analyze algorithms, and how chose the best algorithm for a particular problem based on the performance behavior obtained from an algorithmic analysis.

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**
Mathematical background: recurrences, bounding sums, asymptotic analysis.	6
Design Techniques: Divide and Conquer, Dynamic Programming, Greedy Search, Branch and Bound,	8
Search Structures: Heaps, Balanced Trees, Hashing	8
Amortized Analysis and Data Structures: Fibonacci Heaps and Disjoints sets.	6
Graph Algorithms: search, shortest paths and flow problems	8
Intractability and NP-Completeness	6
Exams	3
Total hours: (equivalent to contact period)	45

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

	Quantity	**Percent**
Exams	**3**	**60%**
Final Exam	**1**	**25%**
Short Quizzes		
Oral Reports		
Monographies		
Portfolio		
Projects	**1-3**	**15%**
Journals		
Other, specify:		

TOTAL:		**100%**

10. Bibliography:

1. Anany V. Levitin, *Introduction to the Design and Analysis of Algorithms*, 3er ed., Addison-Wesley, 2011.
2. Robert Sedgewick and Kevin Wayne, *Algorithms*, 4th ed., Addison-Wesley, 2011.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, and Clifford Steing, *Introduction to Algorithms*, 3er ed., McGrawHill, 2009.

11. Course Outcomes

Upon completion of this course the student will be able to:	Program Student Outcomes Impacted
1. analyze computer algorithms in terms of time and space efficiency	a, b, j, k
2. evaluate different algorithmic paradigms for the design of cost-effective software solutions	a, b, c, j, k
3. apply formal techniques to prove the correctness of an algorithm	a, b, j
4. understand and apply classical fundamental algorithms commonly arising in computing applications (such as, depth-first search, quicksort, ...)	a, b, c, i

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.–