

CIIC 4020 - Course Syllabus

1. General Information:

Alpha-numeric codification: CIIC 4020
Course Title: Data Structures
Number of credits: 4
Contact Period: 3 hours of lectures per week and 2 hours of laboratory per week

Equivalent Course: ICOM 4035

2. Course Description:

English: Data structures in programming languages; representation of information as data; lists in linear, orthogonal, string, and array form; tree structures; techniques for storage allocation, distribution, collection, and sorting of data.

Spanish: Estructuras de datos en lenguajes de programación; representación de información en forma de datos; listas de forma lineal, ortogonal, en sucesión y en arreglo; estructuras tipo árbol; técnicas para el almacenamiento, la distribución, la recolección y el ordenamiento de datos.

3. Pre/Co-requisites and other requirements:

Prerequisites: (CIIC 4010 or ICOM 4015) and MATE 3031 and (CIIC 3075 or ICOM 4075)

4. Course Objectives:

Students will learn how to implement fundamental data structures such as linked lists, hash tables, and trees. Using this knowledge, students will write programs whose major components are built using the data structures previously implemented.

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
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Review of arrays, pointers, classes, inheritance and templates	3
Container classes: Vector, Bag, and Set	3
Discrete Mathematics: Induction and Basic Set Theory	2
Computational Complexity	3
Linked Lists	3
Stacks	2
Queues	2
Trees	5
Binary Search Trees	3
AVL-trees	2
B-trees	2
Maps and Hash Tables	3
Heaps and Priority Queues	3
Graphs and their implementation	2
Graph Traversal Algorithms	2
Sorting	2
Exams	3

Laboratory Sessions	30
Total hours: (equivalent to contact period)	75

8. Grading System

☐ Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☐ Exams	3	40%
☐ Final Exam	1	20%
☐ Short Quizzes		
☐ Oral Reports		
☐ Monographies		
☐ Portfolio		
☐ Projects	2-4	30%
☐ Journals		
☐ Other, specify: Laboratory		10%
TOTAL:		100%

10. Bibliography:

1. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, *Data Structures and Algorithms in Java*, 6th ed., John Wiley and Sons, 2014.
2. Michael Main, *Data Structures and Other Objects Using Java*, 4th ed., Prentice Hall, 2011.
3. Frank M. Carrano, *Data Structures and Abstractions with Java*, 3rd ed., Prentice Hall, 2011,
4. Nell Dale, Daniel T. Joyce and Chip Weems, *Object-Oriented Data Structures Using Java*, 3rd Ed., Jones & Bartlett, 2011.

11. Course Outcomes

Upon completion of this course the student will be able to:	Program Student Outcomes Impacted
1. understand abstract data types and their implementation process	b, c
2. understand fundamental collection data types and some of their implementations and be able to choose the best implementation under given conditions	a, c

3. analyze time complexity and space complexity of algorithms	a, j
4. understand and apply fundamental data structures and algorithms for sorting and searching	a, b
5. design, implement, and apply appropriate data structures and algorithms for solving problems.	j
6. use modern software development tools and techniques to design, implement, and test software applications.	b, i, h
7. work in a team and use modern collaboration tools to develop a software application	d, 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.–

