SAGRADO
Universidad del Sagrado Corazón

Syllabus

Title:	Object-Oriented Programming
Code:	CCO 140
Prerrequisite:	CCO 125
CREDITS:	3 credits | 45 contact hours | 1 term

Description

This course focuses on problem-solving techniques using an object-oriented programming (OOP) language. Students will learn programming concepts such as classes, objects, and inheritance; sorting and search algorithms; recursion; and file handling. They will continue to develop skills in handling aggregated data. They will gain skills in the design and implementation of algorithms using OOP principles, with an emphasis on code modularity, reusability, and maintainability. Programming assignments are required.

Justification

In disciplines related to computer science, it is necessary to understand the fundamental concepts and tools of object-oriented programming and to develop a broad understanding of the discipline, including the handling of aggregate data (classes and objects, files, linked lists). In this way, students will be prepared for a profound study of the various areas that make up the discipline.

COMPETENCIES

The course develops the following competencies in students:

- **Research and Exploration**
- **Communication**

COMPETENCIES

Upon completion of the course, students will be able to:

1. Apply the analysis and synthesis techniques necessary for solving logical problems.
2. Apply object-oriented design tools and model problems using classes and objects.
3. Creatively develop solutions to a problem, using a methodology of successive refinements in algorithm design.
4. Use the elements of a structured, object-oriented programming language.
5. Work with aggregate data types, such as files and linked lists, using simple and nested control structures.
6. Understand and implement recursive algorithms.
7. Understand and implement fundamental sorting and searching algorithms.
8. Produce correct and well-documented programs.
9. Develop team skills, and tolerate and respect ideas and positions that differ from one's own.
10. Handle information and technology appropriately and responsibly, demonstrating a sense of ethics in both professional and personal conduct.
11. Develop self-learning skills.
12. Express their ideas logically, clearly, and coherently in Spanish, both orally and in writing, and recognize the importance of expressing themselves correctly in their professional work, especially when documenting programs.
13. Use multiple sources of information to further their intellectual development.

Content

I. Object-Oriented Programming

   A. Classes, objects, and inheritance
   B. Abstract data types
   C. Code reuse
   D. Polymorphism and *Overloading*
   E. *Abstract Data Types*

II. Arrays

A. One-dimensional

1. Definition
2. Operations
3. Fundamental Algorithms
4. Classes
5. Subprograms: Arrays as Parameters
6. Applications

B. Multidimensional

1. Definition
2. Operations
3. Fundamental Algorithms
4. Classes
5. Subprograms: Arrays as Parameters
6. Applications

III. Other Aggregate Data

A. String Handling
B. Record handling

IV. Files

A. Definition
B. Types
C. Handling
D. File Operations
E. Applications

V. Recursion

A. Definition
B. Applications

VI. Sorting and Search Algorithms

A. Definition
B. Types
C. Comparison
D. Applications

VII. Pointers

A. Definition
B. Applications

VIII. Linked Lists

A. Definition
B. Applications

METHODOLOGY

The following strategies from the active learning methodology are recommended:

- Practice exercises
- Discussions, forums, debates, or panel discussions
- Critical analysis of readings
- Collaborative learning
- Oral presentations

ASSESSMENT

Participation	10%
Midterm assignments	40%
Compositions	20%
Project or Exam (Final Assessment)	30%
TOTAL	100%

Student Learning Assessment

The institutional assessment rubric is applied to the core activity of the course.

BIBLIOGRAPHY

Angel, A., Abbott, C., & Runde, D. A. (2016). *Survey of Mathematics with Applications* (10th ed.). Pearson Addison Wesley.

Brookshear, J. G., & Brylow, D. (2018). *Computer Science: An Overview* (13th ed.). Pearson Addison Wesley.

Deitel, P., & Deitel, H. (2017). *Java: How to Program. Early Objects* (11th ed.). Prentice Hall.

Eck, D.J. (2022). *Introduction to Programming Using Java* (9th ed.).

http://math.hws.edu/javanotes/

Gaddis, T. (2017). *Starting Out with Java: From Control Structures Through Objects* (7th ed.). Addison-Wesley.

Gelgi, F. (2023). *Introduction to Java: A Problem-Solving-Based Approach*. Alphastar Academy.

Knuth, D. (1997). *The Art of Computer Programming, Vol. 1: Fundamental Algorithms* (3rd ed.). Pearson Addison Wesley.

Leonard, A. (2024). *Java Coding Problems: Become an Expert Java Programmer by Solving Real-World Problems* (2nd ed.). Packt Publishing.

Schildt, H. & Coward, D. (2024). *Java: The Complete Reference* (13th ed.). McGraw Hill

ELECTRONIC RESOURCES

Association for Computing Machinery https://www.acm.org/

Codecademy https://www.codecademy.com/learn/learn-java

LearnJavaOnline.org (2015). *Learn Java*. http://www.learnjavaonline.org/

Oracle (2015). *The Java Tutorials*. https://docs.oracle.com/javase/tutorial/ Oracle documentation https://docs.oracle.com/en/java/

Development platforms https://leetcode.com/, https://www.jdoodle.com/, https://ideone.com/

W3Schools Tutorials https://www.w3schools.com/

You can find more resources related to the course topics on the library page http://biblioteca.sagrado.edu/

Reasonable Accomodation

For detailed information on the process and required documentation, please visit the appropriate office. To ensure equal opportunity, in compliance with the Americans with Disabilities Act (1990) and the Rehabilitation Act (1973), as amended, any student who requires Reasonable Accomodation or special assistance must complete the process established by the Vice-Presidency for Academic Affairs.

ACADEMIC INTEGRITY

This policy applies to all students enrolled at the Universidad del Sagrado Corazón to take courses with or without academic credit. A breach of academic integrity is any act or omission that fails to demonstrate the honesty, transparency, and responsibility that should characterize all academic activity. Any student who violates the policy on honesty, fraud, and plagiarism is subject to the following sanctions: a grade of zero on the assessment and/or having to redo the seminar assignment; a grade of F(*) in the seminar; or suspension or expulsion, as established in the Academic Integrity Policy document effective November 2022.

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