

30213 - Data and Algorithm Structures

Syllabus Information

Academic Year: 2019/20

Subject: 30213 - Data and Algorithm Structures

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

326 - Escuela Universitaria Politécnica de Teruel

Degree: 443 - Bachelor's Degree in Informatics Engineering

439 - Bachelor's Degree in Informatics Engineering

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The learning process that is designed for this subject is based on the following:

- The study and work continued since the first day of class.
- Learning concepts and methodologies for the design and implementation of correct, reusable and efficient Abstract Data Types (ADTs) through lectures, in which student participation will be encouraged.
- The application of such knowledge to the design and analysis of algorithms and programs in the classes of problems. In these classes, students will play an active role in the discussion and resolution of problems.
- Labs in which the student will implement several programming projects, applying the concepts and techniques explained in the lectures.
- Teamwork whose result will be reflected in the delivery of suitably designed and documented resulting programs, as well as the explanation and justification of the design and decisions adopted.
- A continued work combining concepts and analysis understanding, problem-solving sessions using "pencil and paper", and the set-up of (small or medium size) programming projects.

4.2.Learning tasks

The course includes the following learning tasks:

Classes of problems to apply the concepts and techniques previously presented.

The practice sessions take place in a computer lab. In these sessions, students will work in teams and perform a number of programming jobs directly related to the topics studied in the course. A series of works or programming exercises will be proposed to be developed either in the laboratory or at home. The result of this work will be delivered within fixed deadlines.

4.3.Syllabus

The course will address the following topics:

1. Programming with Abstract Data Types (ADTs).
2. Linear ADTs.
3. Tree ADTs.
4. Dictionaries and hash tables.
5. Introduction to algorithmic schemes.
6. Introduction to graphs.

4.4.Course planning and calendar

Classroom:

- Theoretical classes (2 hours per week)
- Classes of problems (1 hour weekly)

Labs:

There will be a first face two-hour session in the laboratory. In the rest of the (off-site) practices, students will work in teams, tutored by a teacher. Programming projects will be performed and presented as specified for each of them, and within deadlines to be announced.

Student Work:

The dedication of the student to achieve the learning outcomes in this subject is estimated at 157 hours distributed as follows:

- 47 hours, approximately, of classroom activities (lectures, problems and laboratory face practices)
- 42 hours of programming teamwork
- 62 hours of effective personal study
- 6 hours for exams

4.5.Bibliography and recommended resources

Zaragoza:

Basic Bibliography:

- Weiss, M.A.: *Data Structures and Algorithm Analysis in C++, 4th Edition*, Pearson/Addison Wesley, 2014.
- Hernández, Z.J. y otros: *Fundamentos de Estructuras de Datos. Soluciones en Ada, Java y C++*, Thomson, 2005.
- Shaffer, Clifford A.: *Data Structures and Algorithm Analysis in C++, Third Edition*, Dover Publications, 2013. ([En línea.](#))

Exercises:

- Martí Oliet, N., Ortega Mallén, Y., Verdejo López, J.A.: *Estructuras de datos y métodos algorítmicos: 213 ejercicios resueltos*. 2ª Edición, Ed. Garceta, 2013.
- Joyanes, L., Zahonero, I., Fernández, M. y Sánchez, L.: *Estructura de datos. Libro de problemas*, McGraw Hill, 1999.

Bibliography on C++:

- Stroustrup, B.: *The C++ Programming Language, 4th Edition*, Addison-Wesley, 2013.

Complementary Bibliography:

- Campos Laclaustra, J.: *Estructuras de Datos y Algoritmos*, Prensas Universitarias de Zaragoza, Colección Textos Docentes, 1995.
- Franch Gutiérrez, X.: *Estructuras de Datos. Especificación, Diseño e Implementación*, 3ª edición, Ed. Edicions UPC, 2001.

- Mehta, D.P. y Sahni, S.: *Handbook of Data Structures and Applications*, Chapman & Hall/CRC, 2005.

Teruel:

- BB** Estructura de datos. Libro de problemas / Luis Joyanes Aguilar [et al.] Madrid [etc.] : McGraw-Hill, D.L.1999
- BB** Fundamentos de estructura de datos : soluciones en Ada, Java y C++ / Zenón José Hernández Figueroa ... [et al.] Madrid : Thomson, D.L. 2005
- BB** MARTÍ OLIET, N. Estructura de datos y algoritmos. Ejercicios y problemas resueltos / Nardiso Martí Oliet, Y. Ortega Mallén, J.A. Verdejo López,. Madrid : Prentice Hall, 2003
- BB** Weiss, Mark Allen. Data structures and algorithm analysis in Java / Mark Allen Weiss Reading, Massachusetts [etc.] : Addison-Wesley, cop. 1999
- BB** Weiss, Mark Allen. Estructuras de datos en Java : compatible con Java 2 / Mark Allen Weiss . - 1a ed. en español Madrid : Addison Wesley, cop. 2000
- BC** Martí Oliet, Narciso. Estructuras de datos y métodos algorítmicos : 213 ejercicios resueltos / Narciso Martí Oliet, Alberto Verdejo, Yolanda Ortega Mallén . - 2ª ed. Madrid : Garceta, 2013 [Ejercicios], 2013
- BC** Campos Laclaustra, Javier. Estructuras de datos y algoritmos / Javier Campos Lacastra . - 1ª ed., 1ª reimp. Zaragoza : Prensas Universitarias de Zaragoza, 2001
- BC** Deitel, Paul J.. Java : cómo programar / P. J. Deitel, H. M. Deitel ; traducción Alfonso Vidal Romero Elizondo ; revisión técnica Gabriela Azucena Campos García, Roberto Martínez Román, Jorge Armando Aparicio Lemus. - 7ª ed. Naucalpan de Juárez (Estado de México) : Pearson Educación, 2008
- BC** Franch Gutiérrez, Xavier. Estructuras de datos : Especificación, diseño e implementación / Xavier Franch Gutiérrez . - 2a. ed. Barcelona : UPC, 1996
- BC** Handbook of data structures and applications / edited by Dinesh P. Mehta and Sartaj Sahni Boca Raton, Florida [etc.] : Chapman & Hall/CRC, cop. 2005