

# **Course guide** 220040 - RTP - Real-Time Programming and Database Systems

Last modified: 02/04/2024

Unit in charge: Teaching unit:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering 723 - CS - Department of Computer Science.
Degree:	<ul> <li>BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject).</li> <li>BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).</li> <li>BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject).</li> <li>BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject).</li> <li>BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).</li> </ul>
Academic year: 2024	ECTS Credits: 3.0 Languages: English

LECTURER				
Josefina López Herrera				
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# **PRIOR SKILLS**

programming experience: c/c++

# **TEACHING METHODOLOGY**

Traditional lectures or distance learning. Students will have to design in group a real-time control system. Students will have to design and implement in group a case study.

# LEARNING OBJECTIVES OF THE SUBJECT

Module 1 - Real time algorithms design and implementation: To be able to design both the software and hardware aspects of realtime systems specific concepts, design method, specific functions and algorithms of real-time operating systems, fault tolerance Module 2 - Introduction to database systems, the student should be able to:

- Construct an enhanced entity relationship model at a conceptual level
- Map the model into a relational database system
- Implement the given schema on a relational DBMS
- Use a database language for manipulating and querying the data



# STUDY LOAD

Туре	Hours	Percentage
Hours large group	30,0	40.00
Self study	45,0	60.00

Total learning time: 75 h

# CONTENTS

### 1. Module 1: Real time algorithms design and implementation

#### **Description:**

- 1.1 Introduction to real-time systems (Unified Modeling Language)
- 1.2 Software design and implementation methods for real-time systems
- 1.3 Real-time operating systems
- 1.4 Programming in C on C++
- 1.5 Fault tolerance

#### Related activities:

Traditional lectures or distance learning. Students will have to design in group a real-time control system.

**Full-or-part-time:** 53h Theory classes: 23h Self study : 30h

## 2. Module 2: Introduction to database system

## **Description:**

- 2.1 Introduction
- 2.2 Database concepts
- 2.2.1 Databases
- 2.2.2 Specific purpose vs. resource databases
- 2.2.3 Relational databases
- One-to-one relationships
- One-to-many relationships
- Many-to-many relationships
- Primary and foreign keys
- Data types and definition
- Look-up tables
- Database applications

## **Related activities:**

Traditional lectures or distance learning. Students will have to design and implement in group a case study.

**Full-or-part-time:** 22h Theory classes: 7h Self study : 15h



# **GRADING SYSTEM**

Activities of practical classes, weight: 20 % Module 1: evaluation, weight: 30 % Module2: evaluation, weight: 20 % Project module 1 and Case Study module2 , weight: 30 %

Unsatisfying results of the final exam could be repeated in an exam to be carried out during the period of the final exams. Students with grades lower than 5 points (unsatisfactory) can retake the exam. The new grade, if it is equal or higher than 5 points, will substitute the original one with a grade of 5.

# **EXAMINATION RULES.**

## **BIBLIOGRAPHY**

#### **Basic:**

- Burns, A.; Wellings, A.J. Real-time systems and programming languages: Ada, Real-Time Java and C/Real-Time POSIX. 4th ed. Harlow [etc.]: Addison-Wesley, 2009. ISBN 978-0-321-41745-9.

- López Herrera, J. Programación en tiempo real y bases de datos: un enfoque práctico [on line]. Barcelona: Iniciativa Digital Politècnica, 2011 [Consultation: 06/05/2020]. Available on: <u>http://hdl.handle.net/2099.3/36650</u>. ISBN 9788476536582.

- Sifakis, J.; Bouyssounuouse, B. Embedded systems design: the ARTIST roadmap for research and development. New York: Springer, 2005. ISBN 9783540251071.

- Silberschatz, A.; Korth, H.F.; Sudarshan, S. Database system concepts. 6th ed. New York: McGraw-Hill, 2011. ISBN 9780073523323.

- Silberschatz, A.; Gagne, G.; Galvin, P.B. Fundamentos de sistemas operativos. 7a ed. Madrid, (etc.): McGraw-Hill, 2006. ISBN 8448146417.

#### **Complementary:**

- Levine, W.S.; Hristu-Varsakelis, D. Handbook of networked and embedded control system. Boston [etc.]: Birkhäuser, 2005. ISBN 978-0-8176-3239-7.

- Date, C. J. View updating and relational theory: solving the view update problem. Sebastopol: O'Really, 2013. ISBN 9781449357849.