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

Last modified: 19/04/2023

Unit in charge:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit:	723 - CS - Department of Computer Science.

Degree:	BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Optional subject). BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023   **ECTS Credits:** 3.0   **Languages:** English

LECTURER

Coordinating lecturer:	Josefina López Herrera
Others:	

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 real-time 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

Type	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.

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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: http://hdl.handle.net/2099.3/36650. 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.