

Centre	University College of Engineering of Vitoria-Gasteiz
Name of subject	26021 – Languages, Computation and Intelligent Systems
Qualification	Degree in Computer Management and Information Systems Engineering
Type	Compulsory
Credits	6 ECTS
Year	2
Term(s)	1st
Department	Computer Languages and Systems
Language	Spanish

Outcomes / Objectives

Automata, grammars, formal languages, computability, complexity, programming paradigms, intelligent systems.

Syllabus

Memoryless computation. Finite-state automata and transducers. Regular languages and expressions. Applications: lexical analysis. Memory with restrictions. Pushdown automata. Context-free grammars and languages. Linear bounded automata. Applications: syntax analysis. The general computer model and its limitations. Turing machines. Computational universality and Church-Turing thesis. Incomputability. Introduction to computational complexity. Applications: public key cryptography. Alternatives to the computational model. Models of machines and programming paradigms. Real? circuits and machines. Imperative, functional and logical programs. Applications: automated reasoning. Alternatives to the problem model. Non-functional specifications. Decision trees. Sorters. Probabilistic programming. Applications: machine learning.

Methodology

Teaching Method

Face-to-Face Teaching Hours

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
40			20					

Student Hours of Non Face-To-Face Activities

Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
60			30					

Assessment System

General criteria

Clarification regarding assessment

Bibliography

Basic Bibliography

J.E. HOPCROFT, R. MOTWANI, J.D. ULLMAN: "Teoría de Autómatas, Lenguajes y Computación" 3rd ed. Pearson educación, 2007R. BRENA; "Autómatas y Lenguajes. Un enfoque de diseño" Tec de Monterrey, 2003. [online] Available at <http://litz.mty.itesm.mx/~rbrena/AyL.html> S. RUSSELL, P. NORVIG: "Artificial Intelligence: A Modern Approach" 2nd ed. Prentice Hall, 2003

In-depth Bibliography

S.H. RODGER, T.W. FINLEY; "JFLAP: An Interactive Formal Languages and Automata Package". Jones and Bartlett, 2006

D. WOOD; "Theory of computation". John Wiley & Sons, 1987.

S. ARORA, B. BARAK: "Computational Complexity: A Modern Approach" Cambridge University, 2009.

T. MITCHELL: "Machine Learning" McGraw Hill, 1997

G.F. LUGER, W.A. STUBBLEFIELD: "Artificial Intelligence. Structures and Strategies for Complex Problem Solving." Benjamin/Cummings Publishing Company, Inc, 1998.

Websites

- Java Computability Tool kit (JCT): <http://humboldt.sunyit.edu/jct/>
- Visual and interactive tools (JFLAP): <http://www.jflap.org/>
- Machine Learning theory and examples: <http://www.cs.cmu.edu/~avrim/ML07/index.html>
- Java implementation of AI algorithms: <http://code.google.com/p/aima-java/>