



POLITÉCNICA

INTERNATIONAL
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LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informáticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000610 - Cognitive systems

DEGREE PROGRAMME

10AN - Master Universitario en Ingeniería Informática

ACADEMIC YEAR & SEMESTER

2017/18 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	103000610 - Cognitive systems
No of credits	4.5 ECTS
Type	Compulsory
Academic year of the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	10AN - Master Universitario en Ingeniería Informática
Centre	Escuela Técnica Superior de Ingenieros Informáticos
Academic year	2017-18

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Ernestina Menasalvas Ruiz (Subject coordinator)	4303	ernestina.menasalvas@upm.es	Sin horario. contact the professor
Maria Covadonga Fernandez Baizan		mariacovadonga.fernandez@upm.es	Sin horario.
Alejandro Rodriguez Gonzalez	4302	alejandro.rg@upm.es	Sin horario. contact the professor

Roberto Costumero Moreno		roberto.costumero@upm.es	Sin horario. contact the professor
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* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

2.3. External faculty

Name and surname	Email	Institution
Consuelo Gonzalo Martin	consuelo.gonzalo@upm.es	Universidad Politécnica de Madrid

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

El plan de estudios Master Universitario en Ingeniería Informática no tiene definidas asignaturas previas recomendadas para esta asignatura.

3.2. Other recommended learning outcomes

- Databases
- relational data model
- SQL

4. Skills and learning outcomes *

4.1. Skills to be learned

CE1 - Capacidad para la integración de tecnologías, aplicaciones, servicios y sistemas propios de la Ingeniería Informática, con carácter generalista, y en contextos más amplios y multidisciplinares.

CE8 - Capacidad para analizar las necesidades de información que se plantean en un entorno y llevar a cabo en todas sus etapas el proceso de construcción de un sistema de información.

CG10 - Conocimiento y comprensión de la informática necesaria para la creación de modelos de información, y de los sistemas y procesos complejos

CG14 - Capacidad de trabajar y comunicarse también en contextos internacionales

4.2. Learning outcomes

RA135 - To be able to design, create and exploit data repositories, and integrate them with applications from the information system, being it decisional or operational.

RA136 - To be able to design adequate solutions to implement database systems in centralized or distributed environments, determining and applying the best DBMS configuration to satisfy the performance, access security, and optimization requirements.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

In this course we will cover different aspects of data base management from operational databases to cognitive systems passing through decisional data bases.

In a practical environment it is intended that the student knows what cognitive systems are and acquires the knowledge to process unstructured data based on multidisciplinary corpora. Students will experiment with systems to extract patterns from data in different domains

5.2. Syllabus

1. Data management
 - 1.1. Types of data - structured and unstructured
 - 1.2. Data management and DBMS
 - 1.3. Operational vs. decisional process
 - 1.4. Introduction to Cognitive Systems
2. Data mining
 - 2.1. Process and Projects in Data Mining
 - 2.2. Types of Problems in Data Mining: Techniques and Approach
3. Data Preprocessing
4. Background
 - 4.1. Natural Language Processing (NLP)
 - 4.2. Machine Learning (ML)
 - 4.3. Information Retrieval
5. Extraction of knowledge from data in different domains

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Other face-to-face activities	Assessment activities
1	Data Management Duration: 02:00 Lecture Data Management Duration: 01:00 Lecture			
2	Introduction to Cognitive Computing Duration: 01:00 Lecture Data Management Duration: 02:00 Lecture			
3	Process and Projects in Data Mining Duration: 01:00 Lecture Types of Problems in Data Mining: Techniques and Approach Duration: 02:00 Lecture			
4	Process and projects in Data Mining Duration: 01:00 Lecture Data Preprocessing Duration: 02:00 Lecture			
5	Data Preprocessing Duration: 01:00 Lecture			
6	Data Preprocessing Duration: 02:00 Lecture			
7	Data Preprocessing Duration: 01:00 Lecture Natural Language Processing Duration: 01:00 Lecture			

8	Natural Language Processing Duration: 01:00 Lecture Machine Learning Duration: 02:00 Lecture			
9	Information Retrieval Duration: 01:00 Lecture			
10	Information Retrieval Duration: 01:00 Lecture			
11	Extraction of knowledge from data in different domains Duration: 03:00 Problem-solving class			
12	Extraction of knowledge from data in different domains Duration: 03:00 Problem-solving class			
13	Extraction of knowledge from data in different domains Duration: 03:00 Problem-solving class			
14	Extraction of knowledge from data in different domains Duration: 03:00 Problem-solving class			
15	Extraction of knowledge from data in different domains Duration: 03:00 Problem-solving class			Practical Assignment Delivery Group work Continuous assessment Duration: 00:00
16				Practical assignment oral presentation Group presentation Continuous assessment Duration: 02:00 Exam Written test Continuous assessment Duration: 02:00 Exam Written test Final examination Duration: 02:00
17				

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The subject schedule is based on a previous theoretical planning of the subject plan and might go through experience some unexpected changes along throughout the academic year.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
15	Practical Assignment Delivery	Group work	No Presential	00:00	40%	4 / 10	CG10 CE8 CG14 CE1
16	Practical assignment oral presentation	Group presentation	Face-to-face	02:00	15%	4 / 10	CG10 CE8 CG14 CE1
16	Exam	Written test	Face-to-face	02:00	45%	4 / 10	CG10 CE8 CG14 CE1

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	Exam	Written test	Face-to-face	02:00	100%	4 / 10	CG10 CE8 CG14 CE1

7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

7.2. Assessment criteria

The "only final exam" evaluation will only be offered if the UPM "Normativa Reguladora de los Sistemas de Evaluación" requires so in the academic year 2015-2016, and the procedure to opt in will be as stated by the head of studies. **Continuous evaluation:** The course will be evaluated by 1 practical assignment, 1 exam and different Moodle evaluations. Attendance is mandatory (It is allowed not to attend up to 6 hours without proper justification) Practical assignments will be done in groups among those enrolled in the course at the beginning of the academic year (nature and number of components will be established at the beginning of the course, depending on the number of students enrolled). In order to pass the course in the fall semester the requirements are: 1. To obtain a minimum of 50 points out of 100 in the added evaluation. 2. It is MANDATORY to do the exam and do the practical assignment. 3. In the Moodle evaluations students must obtain a minimum evaluation of 40%. 4. In the final exam students must obtain a minimum of 40%. 5. Attendance to at least 85% of the lectures or having proper justification. Final score will be calculated as follows: 40% Practical assignment + 15% Oral presentation + 5% Moodle evaluation + 40% Final exam

Final exam evaluation Those students whose extraordinary circumstances cannot perform the continuous evaluation, and having done the final exam evaluation written petition during the first 15 days of the course, will perform the final exam evaluation without having the opportunity to do the continuous evaluation; Those students failing to attend 85% of the lectures will also do the final evaluation. In these premises, the final exam evaluation will consist of an exam in January as stated by the head of studies. **July** In order to pass the course in July, an exam must be done in the dates stated by the head of studies. Those students who opt in for the continuous evaluation in the fall semester and fail to pass the course will not save any of the qualifications to July or further evaluations. Measures against copies and fraud Rights and duties of college students are gathered on the statutes of the Universidad Politécnica de Madrid (BOCM de 15 de noviembre de 2010) and in the statutes of the college student (RD 1791/2010 de 30 de diciembre). Article 124 a) of EUPM fixes the duty of the student... "to follow with responsibility and taking advantage of the learning process, knowledge acquisition correspondent to its condition of college student"... and the article 13 of the statutes of the college student in its point d) also specifies as duty of the college student "abstain from the use or cooperation in fraudulent procedures in the evaluation assessments, in the assignments developed or in the official documents of the university". In the case that in the development of the evaluation assessments it is appreciated a breach in the duties as college student, the subject coordinator may communicate the headmaster as established in the article 74 (n) of EUPM to have the competences to "propose the initiation of a disciplinary procedure to any College member, by its own initiative or as instance from the "Comisión de Gobierno"" to the Rector, pursuant to the statutes and rules of application.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Moodle	Web resource	http://moodle.upm.es
Watson website	Web resource	http://www.ibm.com/watson
Unstructured Information Management Architecture (UIMA)	Web resource	http://uima.opennlp.org
Data Mining book	Bibliography	Ian Witten, Eibe Frank, Mark Hall, Data Mining: Practical Machine Learning Tools and Techniques, 3rd Edition, Morgan Kaufmann, ISBN 978-0-12-374856-0, 2011.
Smart Machines book	Bibliography	Smart Machines: IBM's Watson and the Era of Cognitive Computing. Columbia University Press (October 15, 2013)
IBM Watson - How it works	Web resource	http://www.youtube.com/watch?v=_Xcmh1LQB9I
Introducing IBM Watson Discovery Advisor	Web resource	http://www.youtube.com/watch?v=qry_zGZFjOc
Database Systems: The Complete Book (DS:CB), by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom	Bibliography	
"MySQL Administrator's Bible". Sheeri K. Cabral and Keith Murphy. Wiley	Bibliography	
Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison Wesley (May, 2005).	Bibliography	

<p>Ian Witten, Eibe Frank, Mark Hall, Data Mining: Practical Machine Learning Tools and Techniques, 3rd Edition, Morgan Kaufmann, ISBN 978-0-12-374856-0, 2011.</p>	<p>Bibliography</p>	
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