



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informáticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000881 - Adaptive Systems

DEGREE PROGRAMME

10AZ - Master Universitario En Innovación Digital

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 1

Index

Learning guide

1. Description.....	1
2. Faculty.....	1
3. Prior knowledge recommended to take the subject.....	2
4. Skills and learning outcomes	2
5. Brief description of the subject and syllabus.....	3
6. Schedule.....	5
7. Activities and assessment criteria.....	7
8. Teaching resources.....	9
9. Other information.....	10

1. Description

1.1. Subject details

Name of the subject	103000881 - Adaptive Systems
No of credits	4.5 ECTS
Type	Optional
Academic year of the programme	Second year
Semester of tuition	Semester 3
Tuition period	September-January
Tuition languages	English
Degree programme	10AZ - Master Universitario en Innovación Digital
Centre	10 - Escuela Tecnica Superior De Ingenieros Informaticos
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Angelica De Antonio Jimenez	5108	angelica.deantonio@upm.es	W - 10:30 - 14:00 Th - 09:30 - 12:00
Jaime Ramirez Rodriguez (Subject coordinator)	5112	jaime.ramirez@upm.es	M - 16:00 - 18:00 Tu - 16:00 - 18:00 F - 10:00 - 12:00 by appointment by email

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

The subject - recommended (passed), are not defined.

3.2. Other recommended learning outcomes

- Computer programming

4. Skills and learning outcomes *

4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CE-DIPO01 - Capacidad para conceptualizar, diseñar y desarrollar la interacción persona-ordenador de productos y servicios innovadores

CG02 - Que los estudiantes desarrollen la autonomía suficiente para participar en proyectos de investigación y colaboraciones científicas o tecnológicas dentro su ámbito temático explorando y generando nuevas ideas sistemáticamente, en contextos interdisciplinares y, en su caso, con una alta componente de transferencia del conocimiento.

CG03 - La capacidad de usar la lengua inglesa de manera competente, es decir, con capacitación para tareas complejas de trabajo y estudio.

CG06 - Capacidad para gestionar la información.

4.2. Learning outcomes

RA51 - Knowledge of Methods for student modelling and individualized and adapted interaction with learning systems

RA12 - Model the user and to design adaptive user interfaces based on the user

* 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

Interaction design methods focused on providing the same content to all users offer limited possibilities in addressing the specific needs and requirements of different types of users. Therefore, an essential feature of certain interactive applications should be their ability to provide some form of automatic adaptation and customization. The main objective of this course is to achieve an understanding of the models, techniques and architectures necessary to make a computer application dynamically adapt to the specific needs and requirements of different types of users at all times.

Adaptive systems maintain a model of the interests, preferences and / or knowledge of each individual user, and use this model to adapt the behavior of the systems to the needs of that user.

This course will cover the main components of the user model in the context of adaptive systems. And within the adaptive systems, the personalized search systems on the Web will be addressed first and it will be explained how these systems are supported by the user model.

Recommendation systems have become essential tools in many areas of application, because they help alleviate information overload as they select the most appropriate content for each user based on their preferences and / or interests. In this sense, these types of systems help users in decision-making by providing personalized services and help information providers and companies to serve customers more effectively.

In this course, the general characteristics of the recommendation systems will be explained and a classification of these systems will be presented according to the type of techniques they use to generate the recommendations.

According to this classification, we will distinguish between content-based, collaborative filtering, and hybrid recommenders. Following this, an introduction will be given to the main techniques on which each of these groups of recommenders are based, highlighting the strengths and weaknesses of each group.

By designing and testing improved forms of interactive collaboration between humans and digital assistants, we can enable decision-making processes that better leverage the strengths of both partners. To make the interaction between them more fruitful, we can resort to dialogue systems based on natural language processing techniques.

Therefore, one of the topics of the course will be devoted to dialogue systems taking as a case study the cognitive service of IBM, Watson Assistant. Likewise, the problem of designing dialogue systems that are truly adaptive to the user and not mere natural language interfaces for a database will be addressed.

E-learning is a traditional domain for the application of personalization and adaptation technologies. One of the main objectives of these applications is to improve the effectiveness and efficiency of learning experiences. The last topic of the course will be about adaptive e-learning systems paying special attention to intelligent tutoring systems.

5.2. Syllabus

1. User Modeling for Adaptive Systems and Adaptive Web
2. Recommender Systems
3. Dialog Systems
4. Technology-enhanced adaptive learning

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	Presentation of the subject Duration: 02:00		Presentation of the subject Duration: 02:00	
2	User modeling for Adaptive Systems and Adaptive Web Duration: 02:00		User modeling for Adaptive Systems and Adaptive Web Duration: 02:00	
3	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	
4	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	
5	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	Exam Continuous assessment and final examination Not Presential Duration: 01:00
6	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	Research work Continuous assessment and final examination Not Presential Duration: 07:00
7	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	Research work Continuous assessment and final examination Not Presential Duration: 07:00
8	Presentation of the research work Duration: 02:00		Presentation of the research work Duration: 02:00	Research work Continuous assessment and final examination Not Presential Duration: 10:00
9	Recommender Systems Duration: 02:00		Recommender Systems Duration: 02:00	Project work Continuous assessment and final examination Not Presential Duration: 20:00

10	Dialog Systems Duration: 02:00		Dialog Systems Duration: 02:00	Project work Continuous assessment and final examination Not Presential Duration: 20:00
11	Project supervision Duration: 02:00		Project supervision Duration: 02:00	Project work Continuous assessment and final examination Not Presential Duration: 10:00
12	Technology-enhanced adaptive learning Duration: 02:00		Technology-enhanced adaptive learning Duration: 02:00	
13	Technology-enhanced adaptive learning Duration: 02:00		Technology-enhanced adaptive learning Duration: 02:00	
14	Technology-enhanced adaptive learning Duration: 02:00		Technology-enhanced adaptive learning Duration: 02:00	
15	Research topic presentations Duration: 02:00		Research topic presentations Duration: 02:00	Research topic analysis Continuous assessment and final examination Presential Duration: 08:00
16				
17				

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 schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	Exam		No Presential	01:00	10%	0 / 10	CE-DIPO01 CB06 CG03 CG06
6	Research work		No Presential	07:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
7	Research work		No Presential	07:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
8	Research work		No Presential	10:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
9	Project work		No Presential	20:00	20%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
10	Project work		No Presential	20:00	20%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
11	Project work		No Presential	10:00	10%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06

15	Research topic analysis		Face-to-face	08:00	25%	5 / 10	CE-DIPO01 CB06 CG03 CG06
----	-------------------------	--	--------------	-------	-----	--------	-----------------------------------

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	Exam		No Presential	01:00	10%	0 / 10	CE-DIPO01 CB06 CG03 CG06
6	Research work		No Presential	07:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
7	Research work		No Presential	07:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
8	Research work		No Presential	10:00	5%	5 / 10	CE-DIPO01 CB06 CG03 CG06
9	Project work		No Presential	20:00	20%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
10	Project work		No Presential	20:00	20%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
11	Project work		No Presential	10:00	10%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
15	Research topic analysis		Face-to-face	08:00	25%	5 / 10	CE-DIPO01 CB06 CG03 CG06

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Research work		Face-to-face	20:00	75%	5 / 10	CE-DIPO01 CB06 CB07 CG02 CG03 CG06
Exam Technology-enhanced learning		Face-to-face	02:00	25%	5 / 10	CE-DIPO01 CB06 CG03 CG06

7.2. Assessment criteria

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Article	Bibliography	Brusilovsky, Peter, and Eva Millán. 2007. "User Models for Adaptive Hypermedia and Adaptive Educational Systems". The Adaptive Web, 3-53. doi:10.1007/978-3-540-72079-9_1.
book	Bibliography	Ricci, Francesco, Lior Rokach, and Bracha Shapira. 2015. Recommender Systems Handbook. Springer-Verlag. Vol. 54. doi:10.1007/978-0-387-85820-3.
book 2	Bibliography	Brusilovsky, Peter, Alfred Kobsa, and Wolfgang Nejdl. 2007. The Adaptive Web: Methods and Strategies of Web Personalization. The Adaptive Web. Vol. 4321. doi:10.1007/978-3-540-72079-9.

Article 2	Bibliography	O'Donnell, E., Lawless, S., Sharp, M., Wade, V. (2015) A Review of Personalised E-Learning: Towards Supporting Learner Diversity. International Journal of Distance Education Technologies, 13(1), 22-47, January-March 2015
book 3	Bibliography	K. Falk. Practical Recommender Systems. 2019. Publisher: Manning Publications

9. Other information

9.1. Other information about the subject

All the evaluation activities will allow the student to develop also the following skills:

CE-DIPO02: Ability to evaluate the human computer interaction and design of innovative products and services.

CE-DIPO03: Ability to make connections between the wishes and needs of the consumer or client and what technology can offer.

To contact professors, students can use their email addresses included in this document or a Moodle message.

Professors will publish the teaching materials (slides, assignments, etc.) they use throughout the course in the Moodle site of the subject. Additionally, professors will use the Moodle forum of the subject to announce key events and provide relevant information on the subject.