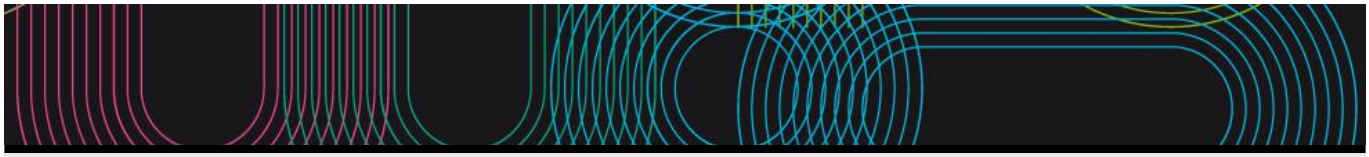

(*)Escola Superior de Enxeñaría Informática

Presentation

In 1991, the University School of Technical Engineering in Computer Management of the University of Vigo was created in the Campus of Ourense together with the degree of Technical Engineering in Computer Management, in order to respond to the needs of graduates in Computer Science demanded by the Galician society. In 1999, after the concession to this Centre of the second cycle of the degree in Computer Engineering, it changed its name to Escuela Superior de Enxeñería Informática (ESEI).

Currently, the Centre offers the following degrees:

- **Degree in Computer Engineering**: A degree adapted to the EEES that incorporates two different professional profiles that are highly attractive in the Galician socio-economic environment:
    - Software Engineering
    - Information Technologies
- **Degree in Artificial Intelligence**: provides the broad, in-depth and multidisciplinary training required by professionals in this field and which is essential to successfully build the intelligent services and applications that are having such an important impact on our lives at all levels.

  This is an inter-university degree in the Galician University System, of four courses (240 ECTS), in which the subjects of the first two courses are common to the three universities (A Coruña, Santiago and Vigo). In the third and fourth years, the University of Vigo develops the orientation in Intelligent Information Systems (SII).

- **University Master's Degree in Computer Engineering**: a degree linked to the profession of Computer Engineering, with 90 ECTS and one and a half years adapted to the EHEA. Its objective is to provide the graduate student with in-depth training in management and administration in the area of information technology, as well as solid knowledge in specific technologies associated with different professional profiles in this field. Graduates acquire technical, communication and leadership skills that enable them to start up their own business or to join management positions in the ICT area in companies and organisations.
- **Master's Degree in Artificial Intelligence**: an inter-university degree, offered by the Universities of A Coruña, Santiago de Compostela and Vigo, which is a complete programme for the training of professionals and entrepreneurs in this branch of knowledge.

All the information about the Centre and its degrees is available on the website esei.uvigo.es.

Organization chart

management teamDirector

: Arno Formella

- He is responsible for the running of the School, implementing the agreements of the collegiate bodies, executing the budget and representing the Centre both within the University and before institutions and society in general.

- Email: formella(at)uvigo.es
- Telephone: +34 988 387 002

Deputy Director of Planning

: Francisco Javier Rodríguez Martínez

- He is responsible for the planning, definition, implementation, evaluation and monitoring of the procedures and processes of the ESEI.
- Email: franjrm(at)uvigo.es
- Telephone: +34 988 387 022

Deputy Director of Academic Organisation

: Rosalía Laza Fidalgo

- She is responsible for the organisation of teaching at the School: timetables, exam calendars, teaching control, control of tutorials...
- Email: rlaza(at)uvigo.es
- Telephone: +34 988 387 013

Deputy Director of Quality

: Eva Lorenzo Iglesias

- She is in charge of ensuring compliance with the Internal Quality Assurance System.
- Email: eva(at)uvigo.es
- Telephone: +34 988 387 019

Secretary of the Centre

: María Encarnación González Rufino

- She is in charge of taking the minutes of the School's collegiate bodies, as well as certifying the agreements taken in them.
- Email: secretaria.esei(at)uvigo.es
- Telephone: +34 988 387 016

Within the management team, the secretary of the school, María Encarnación González Rufino, is the

Equality Liaison Officer

, and is responsible for the dynamisation and implementation of equality policies. This person is the liaison with the

Equality Unit

of the University of Vigo to contribute to the application and monitoring of the measures proposed in the I Plan for Equality between women and men of the University of Vigo, with a view to achieving a more balanced participation of women and men in our University.

In addition to the management team, there are several professors in charge of coordinating the degree courses:

Coordinator of the Degree in Computer Engineering

: Eva Lorenzo Iglesias

Email: eva(at)uvigo.es

Phone: +34 988 387 019

Coordinator of the Degree in Artificial Intelligence

: Lourdes Borrajo Diz

Email: lborrajo(at)uvigo.es

Phone: +34 988 387 028

Coordinator of the Master's Degree in Computer Engineering

: Alma Gómez Rodríguez

Email: alma(at)uvigo.es

Phone: +34 988 387 008

Coordinator of the Master's Degree in Artificial Intelligence

: Francisco Javier Rodríguez Martínez

Email: franjrm(at)uvigo.es

Phone: +34 988 387 022

Location

Escola Superior de Enxeñería Informática.

Campus de Ourense - Universidad de Vigo

Edificio Politécnico. As Lagoas s/n

32004 - Ourense (Spain)

Teléfonos: +34 988 387000, +34 988 387002

Fax: +34 988 387001

Web: esei.uvigo.es

Regulations and legislation

Available on the Centre's website (esei.uvigo.es)

Center services

teaching equipment

14 computer laboratories with 24 individual workstations and different operating systems

1 Electronics Technology laboratory

1 Computer Architecture laboratory

1 end-of-degree project laboratory

6 theory classrooms

6 seminars for group tutorials

added values

Classes in English in various subjects

Guidance teacher in the first year.

E-mail for students.

Storage directory for students, accessible from the Internet.

E-learning platform.

Wireless Internet access from all over campus.

Campus library with 120,000 volumes.

Alumni Delegation.

Premises for student associations.

University residence.

Hall of Degrees and Assembly Hall.

Cafeteria.

Máster universitario en Inteligencia artificial

Subjects

Year 2nd

Code	Name	Quadmester	Total Cr.
O06M193V01301	Computational aspects of cognitive science	1st	3
O06M193V01302	Text mining	1st	3
O06M193V01303	AI in big data environments	1st	6
O06M193V01304	AI in health	1st	3
O06M193V01305	Intelligent IoT	1st	3
O06M193V01306	Intelligent cibersecurity	1st	3
O06M193V01307	Emergent and entrepreneurial aspects in IA	1st	3
O06M193V01308	Internships	1st	6
O06M193V01309	Master Thesis	1st	12

IDENTIFYING DATA				
Computational aspects of cognitive science				
Subject	Computational aspects of cognitive science			
Code	O06M193V01301			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language				
Department				
Coordinator	Formella , Arno			
Lecturers	Formella , Arno			
E-mail	formella@uvigo.es			
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description

Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations

IDENTIFYING DATA

Text mining

Subject	Text mining			
Code	O06M193V01302			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Ribadas Pena, Francisco José			
Lecturers	A0075-Ax2tc-1 A0075-Ax2tc-1, A0075-Ax2tc-1 A0075-Ax2tc-2 A0075-Ax2tc-2, A0075-Ax2tc-2 Ribadas Pena, Francisco José			
E-mail	ribadas@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	The course introduces the student to the derivation of information and knowledge from the analysis of a collection of documents in natural language, which refers to almost all generated and stored data. The student will be trained in content analysis on enriched document representation models to address specific applications in different domains. Special attention will be paid to the extraction of relevant information, the determination of the contextual polarity (sentiment) of a content, and the automatic response to questions posed directly in natural language. In short, the goal is to answer fundamental questions in the development of interfaces, decision support environments, and access to new knowledge.			

Training and Learning Results

Code	
A1	CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
A2	CB7 - Students should be able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A5	CB10 - That students possess the learning skills that will enable them to continue studying in a manner that will be largely self-directed or autonomous.
B1	Maintain and extend sound theoretical approaches to enable the introduction and exploitation of new and advanced technologies in the field of Artificial Intelligence.
B3	Search and select useful information needed to solve complex problems, handling with fluency the bibliographic sources of the field.
B4	Elaborate adequately and with certain originality written compositions or motivated arguments, write plans, work projects, scientific articles and formulate reasonable hypotheses in the field.
C1	Understanding and mastering techniques for text processing in natural language
C2	Understanding and mastery of the fundamentals and techniques of semantic processing of linked, structured, and unstructured documents, and of the representation of their content.
C3	Understanding and knowledge of the techniques of representation and processing of knowledge through ontologies, graphs, and RDF, as well as the tools associated with them.
D2	Master the oral and written expression and comprehension of a foreign language.
D3	Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de su vida.
D7	Develop the ability to work in interdisciplinary or transdisciplinary teams to offer proposals that contribute to sustainable environmental, economic, political and social development.
D8	Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society.

Expected results from this subject

Expected results from this subject	Training and Learning Results

New	A1 A2 A5 B1 B3 B4 C1 C2 C3 D2 D3 D7 D8

Contents	
Topic	
Document analysis	Concepts and definitions. Plot structure, coherence, and co-references.
Information retrieval and extraction.	Concepts and definitions. IR (Information Retrieval) techniques and tools. IE (Information Extraction) techniques and tools.
Sentiment analysis	Concepts and definitions. Techniques and tools. Current trends.
Question answering	Concepts and definitions. Typical architectures, technical and tools. Current trends.
Other text mining applications.	Emerging tasks. Text mining in specific domains.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	10	10	20
Laboratory practical	5	15	20
Mentored work	5	29	34
Objective questions exam	1	0	1
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Presentation of the theoretical content of the course. In order to facilitate the understanding of the same and to increase the interest of the student, various examples and exercises will be included, in which the active participation of the student may be required. Various examples and exercises in which the active participation of the student may be required. An active attitude is promoted by encouraging questions and proposing open-ended questions for the student's reflection.
Laboratory practical	Hands-on problems that involve the use of specific tools and the programming of software related to the course content. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: mandatory

Mentored work	One or more individual theoretical-practical works, deliverable and evaluable, on the theoretical aspects presented in the course and worked on in the practical activities developed by the students. This is an autonomous task that will have occasional guidance from the teacher. The result will be expressed in one or more reports with a structure to be determined. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: mandatory

Personalized assistance

Methodologies	Description
Laboratory practical	The teacher will guide the student in the laboratory for the realization of the projects that will be evaluated at the end of the course, answering doubts and questions individually.
Mentored work	Follow-up of students' work, solving general doubts and sharing specific theoretical/practical problems related to the course topics.

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Evaluation of the proposed hands-on exercises by submitting a writen report and/or the developed code. The submission of these exercises is mandatory. They will have a delivery date and, optionally, a defense date. - MINIMUM SCORE: 4 points out of 10 - LEARNING OUTCOMES: RA1	40	A2	B1	C1 C2 C3	D3 D8
Mentored work	Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature assigned to each student. The ability to synthesize, completeness and adequate presentation of ideas and concepts related to the chosen topic will be evaluated. The submission of these papers is compulsory. They will have a due date and, optionally, a defense date - MINIMUM SCORE: 4 points out of 10 - LEARNING OUTCOMES: RA1	40	A1 A5	B3 B4	C1 C2 C3	D2 D8
Objective questions exam	Written test that evaluates the content and competencies reviewed in the lectures and the theoretical aspects of their implementation in the practical sessions. The type of test will consist of a series of multiple choice or short answer questions on specific concepts. It will take place on the official date indicated in the academic calendar. - MINIMUM SCORE: no minimum score required - LEARNING OUTCOMES: RA1	20	A1 A2	B1	C1 C2 C3	

Other comments on the Evaluation

(1) CONTINUOUS ASSEMENT SYSTEM

TEST 1: Practical hand-on exercises

Description: Evaluation of the writen reports and the code of the laboratory hand-on exercises delivered on the

stipulated dates.

Applied methodology: Laboratory practical

% Qualification: 40%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A2, B1, C1, C2, C3, D3, D8

Expected results: RA1

TEST 2: Tutored work/essay

Description: Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature

assigned to each student.

Applied methodology: Mentored work

% Qualification: 40%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A2, A5, B3, B4, C1, C2, C3, D2, D8

Expected results: RA1

TEST 3: Final exam

Description: Multiple-choice final test on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 20%

Minimum %: no minimum score required

Evaluated learning results: : A1, A2, B1, C1, C2, C3

Expected results: RA1

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in the final weighted grade a minimum of 5 points out of 10.
- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total contribution of the corresponding evaluation element on the final grade will be annulled.

(2) GLOBAL ASSEMENT SYSTEM

Procedure for the choice of the global assessment modality:

- The continuous assessment modality is assumed by default.
- Students who opt for the global evaluation must communicate it via Moovi, using the mechanisms that are enabled and within the stipulated period, once the period of one month from the beginning of the term has passed.

TEST 1: Practical hand-on exercises

Description: Evaluation of the writen reports and the code of the laboratory hand-on exercises delivered on the

stipulated dates.

Applied methodology: Laboratory practical

% Qualification: 40%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A2, B1, C1, C2, C3, D3, D8

Expected results: RA1

TEST 2: Tutored work/essay

Description: Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature

assigned to each student.

Applied methodology: Mentored work

% Qualification: 40%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A2, A5, B3, B4, C1, C2, C3, D2, D8

Expected results: RA1

TEST 3: Final exam

Description: Multiple-choice final test on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 20%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: : A1, A2, B1, C1, C2, C3

Expected results: RA1

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in the final weighted grade a minimum of 5 points out of 10.
- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total contribution of the corresponding evaluation element on the final grade will be annulled.

(3) ASSESSMENT CRITERIA FOR EXTRAORDINARY AND FINAL CALLS

- The continuous and global evaluation systems described above will be used.

- In these calls, students must only take the tests in which they have not obtained the minimum grade indicated.

(4) GRADING PROCESS

In the case of students who pass part of the evaluated elements, but do not reach the minimum required to pass the whole subject, the grade to be included in the respective minutes will be calculated as the minimum between the weighted average of the parts passed and 4.9.

(5) EVALUATION DATES

The official exam dates of the different calls, officially approved by the Xunta de Centro of the ESEI, are published on the ESEI website https://esei.uvigo.es/docencia/horarios/.

(6) USE OF MOBILE DEVICES

All students are reminded of the prohibition of the use of mobile devices in exercises and practices, in compliance with article 13.2.d) of the University Student Statute, regarding the duties of university students, which establishes the duty to "Refrain from using or cooperating in fraudulent procedures in the assessment activities, in the delivered assignments or in official documents of the university."

(7) TUTORING SCHEDULE AND PERSONAL TUTORING REQUEST

The tutoring schedule, and the way to request a personal tutoring, is published in the personal page of the teaching staff, accessible through https://esei.uvigo.es/docencia/profesorado/.

Sources of information

Basic Bibliography

Apuntes y material proporcionado por el profesorado.,

Berry, M. W., & Kogan, J. (Eds.)., **Text mining: applications and theory.**, 978-0-470-74982-1, 1, John Wiley & Sons., 2010

Complementary Bibliography

Taeho Jo, **Text Mining: Concepts, Implementation, and Big Data Challenge (Studies in Big Data Book 45)**, 978-3319918143, 1, Springer, 2019

Recommendations

Subjects that it is recommended to have taken before

Natural language understanding/O06M193V01104
Language modelling/O06M193V01204

Other comments

Course coordinated by the University of Vigo

IDENTIFYING DATA

AI in big data environments

Subject	AI in big data environments			
Code	O06M193V01303			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Ribadas Pena, Francisco José			
Lecturers	A0075-Ax2tc-1 A0075-Ax2tc-1, A0075-Ax2tc-1 A0075-Ax2tc-2 A0075-Ax2tc-2, A0075-Ax2tc-2 Ribadas Pena, Francisco José			
E-mail	ribadas@uvigo.es			
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description	The every time greater quantity of accessible information through Internet does that the efficient processing of big quantities of data was every time of greater interest. This has carried to the development of new technicians of storage and processing of *ingentes quantities of information, technicians that adapt of natural form to the systems distributed. The main aim of this matter is to provide to the students the knowledges and necessary skills to comprise, develop and apply technicians of artificial intelligence (*IA) in surroundings of *Big Dates.			

Training and Learning Results

Code	
A1	CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
A2	CB7 - Students should be able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A3	CB8 - the complexity of making judgments based on information that, while incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
B2	Successfully address all stages of an Artificial Intelligence project.
B3	Search and select useful information needed to solve complex problems, handling with fluency the bibliographic sources of the field.
B4	Elaborate adequately and with certain originality written compositions or motivated arguments, write plans, work projects, scientific articles and formulate reasonable hypotheses in the field.
B5	Work in teams, especially multidisciplinary teams, and be skilled in time management, people management and decision making.
C10	Ability to build, validate and apply a stochastic model of a real system from observed data and the critical analysis of the results obtained
C11	Understanding and mastery of the main data analysis techniques and tools, both from a statistical and machine learning point of view, including those dedicated to the processing of large volumes of data, and the ability to select the most appropriate ones for problem solving.
C12	Ability to plan, formulate and resolve all stages of a data project, including understanding and mastery of basic fundamentals and techniques for searching and filtering information in large data collections.
C15	Knowledge of computer tools in the field of machine learning, and ability to select the most appropriate for solving a problem.
D3	Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de su vida.
D7	Develop the ability to work in interdisciplinary or transdisciplinary teams to offer proposals that contribute to sustainable environmental, economic, political and social development.
D8	Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society.
D9	Have the ability to manage time and resources: develop plans, prioritize activities, identify critical ones, set deadlines and meet them.

Expected results from this subject

Expected results from this subject	Training and Learning Results

New	A2 B2 C10 C11 C12 C15 D3
New	A1 A2 A3 B3 B4 B5 C10 C11 C12 C15 D3 D7 D8 D9
New	A1 A2 A3 B2 B3 B4 B5 C10 C11 C12 C15 D3 D7 D8 D9
New	A1 A2 A3 B2 C12 C15 D3 D7 D9
New	A1 A2 B3 B5 C11 C15 D3 D7 D9
New	A1 A3 B2 B3 B5 C11 C12 C15 D3 D7 D8 D9

New	A2 A3 B2 B3 C10 C11 C15 D3 D9

Contents	
Topic	
(*)Introdución ao Big Data	(*)Que é Big Data Aplicacións Big Data Analítica Big Data Problemática da análise de datos en contornas Big Data
(*)Preparación e visualización de datos	(*)Técnicas de preprocesado de datos Técnicas de visualización
(*)Infraestructuras para o almacenamento e procesamento de Big Data: Apache Hadoop e Apache Spark	(*)Procesamento distribuido e infraestructuras Aprendizaxe por lotes en plataformas paralelas e distribuidas Aprendizaxe distribuida en vertical e horizontal
(*)Tratamento de datos en continuo	(*)Aprendizaxe incremental Aprendizaxe en tempo real Problemas de cambio de concepto

Planning	Class hours	Hours outside the classroom	Total hours
Laboratory practical	14	44	58
Mentored work	9	20	29
Lecturing	20	21	41
Objective questions exam	2	20	22
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	Description
Laboratory practical	(*)Clases prácticas en el aula de informática, que permiten al alumno familiarizarse desde un punto de vista práctico con las cuestiones expuestas en las clases teóricas.
Mentored work	(*)Aprendizaje basado en problemas, seminarios, estudio de casos o proyectos, que permiten que el alumnado adquiera determinadas competencias en base a la resolución de ejercicios, estudio de casos y realización de proyectos.
Lecturing	(*)Clases de teoría, en las que se expone el contenido de cada tema. El alumno dispondrá de copias de las transparencias con anterioridad y el profesor promoverá una actitud activa, realizando preguntas que permitan aclarar aspectos concretos y dejando cuestiones abiertas para la reflexión del alumno.

Personalized assistance	
Methodologies	**Description**
Laboratory practical	
Mentored work	

Assessment	Description	Qualification	Training and Learning Results
Laboratory practical	(*)Avaliación de traballos prácticos: 50% dá nota Avaliaranse as solucións propostas polo alumnado ás prácticas expostas. A avaliación de prácticas pode levar a cabo mediante unha corrección por parte do profesor, unha defensa da solución achegada por parte do alumno ante o profesor ou unha presentación oral da solución desenvolvida. Todos os traballos deberán ser entregados antes das datas que se especificarán e deberán cumprir uns requisitos mínimos de calidade para ser tidos en consideración. Valorarase o grao de cumprimento das especificacións, a metodoloxía e rigorosidade e a presentación de resultados	50	A1 B2 C10 D3 A2 B3 C11 D7 A3 B4 C12 D8 B5 C15 D9

Objective questions exam	(*)Preguntas sobre os contidos da asignatura (que poden ser de tipo test ou problemas para resolver), baseada nas distintas técnicas avanzadas de aprendizaxe automática e as súas aplicacións.	50	A1 A2 A3	B2	C10 C11 C12 C15	D8 D9

Other comments on the Evaluation

Sources of information

Basic Bibliography

Apuntes y material proporcionado por el profesorado.,

Tom White, **Hadoop: The Definitive Guide, 4th Edition**, 9781491901632, 4, O'Reilly Media, Inc., 2015

Bill Chambers, Matei Zaharia, **Spark: The Definitive Guide**, 9781491912218, 1, O'Reilly Media, Inc., 2018

Complementary Bibliography

Rezaul Karim, Sridhar Alla, **Scala and Spark for Big Data Analytics**, 978-1785280849, 1, Packt Publishing, 2017

Nick Pentreath, **Machine Learning with Spark**, 978-1783288519, 1, Packt Publishing, 2015

Michael Bowles, **Machine Learning with Spark and Python: Essential Techniques for Predictive Analytics**, 978-1-119-56193-4, 2, Wiley, 2019

Recommendations

Subjects that it is recommended to have taken before

Machine learning I/O06M193V01105

Machine learning II/O06M193V01207

Deep learning/O06M193V01206

Data engineering/O06M193V01102

IDENTIFYING DATA				
AI in health				
Subject	AI in health			
Code	O06M193V01304			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language				
Department				
Coordinator	García Lourenco, Analia María			
Lecturers	García Lourenco, Analia María			
E-mail	analia@uvigo.es			
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies
Description

Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations

IDENTIFYING DATA				
Intelligent IoT				
Subject	Intelligent IoT			
Code	O06M193V01305			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language	Spanish English			
Department				
Coordinator	Diaz-Cacho Medina, Miguel Ramón			
Lecturers	Diaz-Cacho Medina, Miguel Ramón			
E-mail	mcacho@uvigo.es			
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies
Description

Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations

IDENTIFYING DATA				
Intelligent cibersecurity				
Subject	Intelligent cibersecurity			
Code	O06M193V01306			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Ribadas Pena, Francisco José			
Lecturers	A0075-Ax2tc-2 A0075-Ax2tc-2, A0075-Ax2tc-2 Ribadas Pena, Francisco José			
E-mail	ribadas@uvigo.es			
Web				
General description	The course introduces the student to the development of strategies based on artificial intelligence for the defense of computer systems and networks against malicious attacks that seek to control them or to gain access to the information residing or circulating in them. Students will be trained in the prevention, detection, analysis and elimination of threats in a continuously evolving context. Typical use cases of artificial intelligence in cybersecurity scenarios will be reviewed.			

Training and Learning Results	
Code	
A1	CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
A2	CB7 - Students should be able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
A4	CB9 - Students should be able to communicate their conclusions and the ultimate knowledge and rationale behind them to specialized and non-specialized audiences in a clear and unambiguous manner.
A5	CB10 - That students possess the learning skills that will enable them to continue studying in a manner that will be largely self-directed or autonomous.
B1	Maintain and extend sound theoretical approaches to enable the introduction and exploitation of new and advanced technologies in the field of Artificial Intelligence.
B2	Successfully address all stages of an Artificial Intelligence project.
B4	Elaborate adequately and with certain originality written compositions or motivated arguments, write plans, work projects, scientific articles and formulate reasonable hypotheses in the field.
B5	Work in teams, especially multidisciplinary teams, and be skilled in time management, people management and decision making.
C8	Ability to design and develop secure intelligent systems, in terms of integrity, confidentiality and robustness.
C19	Knowledge of different application areas of AI-based technologies and their capacity to offer a differentiating added value.
C20	Ability to combine and adapt different techniques, extrapolating knowledge between different fields of application.
C21	Knowledge of techniques that facilitate the organization and management of AI projects in real environments, resource management and task planning in an efficient way, taking into account concepts of knowledge dissemination and open science.
C22	Knowledge of techniques that facilitate the security of data, applications and communications and their implications in different AI application areas.
C30	Be able to pose, model and solve problems requiring the application of artificial intelligence methods, techniques and technologies.
D5	To understand the importance of the entrepreneurial culture and to know the means available to entrepreneurs.
D8	Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society.
D9	Have the ability to manage time and resources: develop plans, prioritize activities, identify critical ones, set deadlines and meet them.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

RA1: Know techniques and tools to implement AI-based solutions that allow automated detection of vulnerabilities, attacks, fraudulent content and applications.	A1 A2 B1 B2 C8 C19 C21 C22 D8 D9
RA2: Know, understand and analyze real cases of application of AI techniques in different areas of cybersecurity.	A2 A5 B2 B5 C8 C20 C22 C30 D5 D8
RA3: To learn techniques that facilitate security by design and enable secure administration of communications systems and networks, allow risk management and enable rapid recovery from cybersecurity events.	A1 A2 B1 B4 C21 C22 C30 D5
RA4: To understand the importance of the concept of identity and to learn techniques to ensure data access and privacy.	A2 A4 B4 B5 C8 C20 C22 D8

Contents
Topic
Introduction to cybersecurity and related concepts.
Threat detection and attack prevention models.
Detection of fraudulent content and applications.
Data mining in event management systems.
Identity control, biometrics and behavioral patterns.
Anomaly detection and clustering for the detection of communication attacks.
IA risk management, critical risks and normal profiles, malicious uses, and contingency and recovery plans.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	10	10	20
Laboratory practical	5	15	20
Mentored work	5	29	34
Objective questions exam	1	0	1
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies
Description

Lecturing	Presentation of the theoretical content of the course. In order to facilitate the understanding of the same and to increase the interest of the student, various examples and exercises will be included, in which the active participation of the student may be required. Various examples and exercises in which the active participation of the student may be required. An active attitude is promoted by encouraging questions and proposing open-ended questions for the student's reflection.
Laboratory practical	Hands-on problems that involve the use of specific tools and the programming of software related to the course content. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: mandatory
Mentored work	One or more individual theoretical-practical works, deliverable and evaluable, on the theoretical aspects presented in the course and worked on in the practical activities developed by the students. This is an autonomous task that will have occasional guidance from the teacher. The result will be expressed in one or more reports with a structure to be determined. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: mandatory

Personalized assistance

Methodologies	Description
Laboratory practical	The teacher will guide the student in the laboratory for the realization of the projects that will be evaluated at the end of the course, answering doubts and questions individually.
Mentored work	Follow-up of students' work, solving general doubts and sharing specific theoretical/practical problems related to the course topics.

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Evaluation of the proposed hands-on exercises by submitting a writen report and/or the developed code. The submission of these exercises is mandatory. They will have a delivery date and, optionally, a defense date. - MINIMUM SCORE: 4 points out of 10 - LEARNING OUTCOMES: RA1, RA2, RA3, RA4	40	A1 A2 A5	B1 B2 B5	C8 C19 C20 C21 C22 C30	D5 D8 D9
Mentored work	Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature assigned to each student. The ability to synthesize, completeness and adequate presentation of ideas and concepts related to the chosen topic will be evaluated. The submission of these papers is compulsory. They will have a due date and, optionally, a defense date - MINIMUM SCORE: 4 points out of 10 - LEARNING OUTCOMES: RA1, RA2, RA3, RA4	40	A1 A4	B4 B5	C19 C20 C22 C30	D8 D9

Objective questions exam	Written test that evaluates the content and competencies reviewed in the lectures and the theoretical aspects of their implementation in the practical sessions. The type of test will consist of a series of multiple choice or short answer questions on specific concepts. It will take place on the official date indicated in the academic calendar. - MINIMUM SCORE: no minimum score required - LEARNING OUTCOMES: RA1, RA2, RA3, RA4	20	A5	B1	C8 C19 C20 C21 C22 C30

Other comments on the Evaluation

(1) CONTINUOUS ASSEMENT SYSTEM

TEST 1: Practical hand-on exercises

Description: Evaluation of the writen reports and the code of the laboratory hand-on exercises delivered on the

stipulated dates.

Applied methodology: Laboratory practical

% Qualification: 40%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A1,A2,A5,B1,B2,B5,C8,C19,C20,C21,C22,C30,D5,D8,D9

Expected results: RA1, RA2, RA3, RA4

TEST 2: Tutored work/essay

Description: Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature

assigned to each student.

Applied methodology: Mentored work

% Qualification: 40%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A1,A4,B4,B5,C19,C20,C22,C30,D8,D9

Expected results: RA1, RA2, RA3, RA4

TEST 3: Final exam

Description: Multiple-choice final test on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 20%

Minimum %: no minimum score required

Evaluated learning results: : A5,B1,C8,C19,C20,C21,C22,C30

Expected results: RA1, RA2, RA3, RA4

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in the final weighted grade a minimum of 5 points out of 10.
- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total contribution of the corresponding evaluation element on the final grade will be annulled.

(2) GLOBAL ASSEMENT SYSTEM

Procedure for the choice of the global assessment modality:

- The continuous assessment modality is assumed by default.
- Students who opt for the global evaluation must communicate it via Moovi, using the mechanisms that are enabled and within the stipulated period, once the period of one month from the beginning of the term has passed.

TEST 1: Practical hand-on exercises

Description: Evaluation of the writen reports and the code of the laboratory hand-on exercises delivered on the stipulated dates.

Applied methodology: Laboratory practical

% Qualification: 40%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: : A1,A2,A5,B1,B2,B5,C8,C19,C20,C21,C22,C30,D5,D8,D9

Expected results: RA1, RA2, RA3, RA4

TEST 2: Tutored work/essay

Description: Evaluation of the writen report of the supervised research work (or works) of theoretical-practical nature

assigned to each student.

Applied methodology: Mentored work

% Qualification: 40%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A1,A4,B4,B5,C19,C20,C22,C30,D8,D9

Expected results: RA1, RA2, RA3, RA4

TEST 3: Final exam

Description: Multiple-choice final test on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 20%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A5,B1,C8,C19,C20,C21,C22,C30

Expected results: RA1, RA2, RA3, RA4

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in the final weighted grade a minimum of 5 points out of 10.
- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total

contribution of the corresponding evaluation element on the final grade will be annulled.

(3) ASSESSMENT CRITERIA FOR EXTRAORDINARY AND FINAL CALLS

- The continuous and global evaluation systems described above will be used.

- In these calls, students must only take the tests in which they have not obtained the minimum grade indicated.

(4) GRADING PROCESS

In the case of students who pass part of the evaluated elements, but do not reach the minimum required to pass the whole subject, the grade to be included in the respective minutes will be calculated as the minimum between the weighted average of the parts passed and 4.9.

(5) EVALUATION DATES

The official exam dates of the different calls, officially approved by the Xunta de Centro of the ESEI, are published on the ESEI website https://esei.uvigo.es/docencia/horarios/.

(6) USE OF MOBILE DEVICES

All students are reminded of the prohibition of the use of mobile devices in exercises and practices, in compliance with article 13.2.d) of the University Student Statute, regarding the duties of university students, which establishes the duty to "Refrain from using or cooperating in fraudulent procedures in the assessment activities, in the delivered assignments or in official documents of the university."

(7) TUTORING SCHEDULE AND PERSONAL TUTORING REQUEST

The tutoring schedule, and the way to request a personal tutoring, is published in the personal page of the teaching staff, accessible through https://esei.uvigo.es/docencia/profesorado/.

Sources of information

Basic Bibliography

William Stallings, **Effective Cybersecurity: A Guide to Using Best Practices and Standards.**, 978-0134772806, 1, Addison-Wesley Professional, 2018

Complementary Bibliography

Alessandro Parisi, **Hands-On Artificial Intelligence for Cybersecurity: Implement smart AI systems for preventing cyber attacks and detecting threats and network anomalies.**, 978-1789804027, 1, Packt Publishing, 2019

Recommendations

Subjects that it is recommended to have taken before

Machine learning I/O06M193V01105
Machine learning II/O06M193V01207
Deep learning/O06M193V01206
Knowledge and reasoning under uncertainty/O06M193V01203

Other comments

Course coordinated by the University of Vigo

IDENTIFYING DATA				
Emergent and entrepreneurial aspects in IA				
Subject	Emergent and entrepreneurial aspects in IA			
Code	O06M193V01307			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	2nd	1st
Teaching language				
Department				
Coordinator	García Lourenco, Analia María			
Lecturers	García Lourenco, Analia María			
E-mail	analia@uvigo.es			
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

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Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations

IDENTIFYING DATA				
Internships				
Subject	Internships			
Code	O06M193V01308			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
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Methodologies	
	Description

Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations

IDENTIFYING DATA				
Master Thesis				
Subject	Master Thesis			
Code	O06M193V01309			
Study programme	Máster universitario en Inteligencia artificial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	12	Mandatory	2nd	1st
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				
Web	http://guiadocente.udc.es/guia_docent/index.php?centre=614&ensenyament=614544&consulta=assignatures&any_academic=2023_24			
General description				

Training and Learning Results
Code

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Contents
Topic

Planning			
	Class hours	Hours outside the classroom	Total hours
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description

Personalized assistance

Assessment		
Description	Qualification	Training and Learning Results

Other comments on the Evaluation

Sources of information
Basic Bibliography
Complementary Bibliography

Recommendations