

**DEPARTMENT OF COMPUTER SCIENCE AND
NUMERICAL ANALYSIS
University of Córdoba**

Activity Report
Course 2020/2021

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1. Introduction

This report aims to reflect a summary of the teaching and research activities of the Department of Computer Science and Numerical Analysis of the University of Córdoba during the 2020/21 academic year.

This Department is made up of three areas of knowledge:

- Mathematical Analysis (3 professors and 1 professor).
- Computer Science and Artificial Intelligence (5 professors and 26 professors).

Teaching is given in 6 centers and a total of 18 degrees and 2 master's degrees.

The Department is made up of 5 research groups that throughout the 20/21 academic year published more than 90 articles in indexed journals and participated in 10 research projects and 4 R&D contracts with companies.

2. Department Personnel

2.1 Management Staff

Director: Ángel Carmona Poyato.

Secretary: Amelia Zafra Gómez.

2.2 Teaching Staff

Area of Mathematical Analysis	
Carmen Calzada Canalejo	Associate Professor
Enrique Delgado Ávila	Assistant Professor
Marina Esteban Pérez	Assistant Professor
Mercedes Marín Beltrán	Associate Professor

Area of Computer Science	
José Luis Ávila Jiménez	Associate Professor
Antonio Calvo Cuenca	Associate Professor
Ángel Carmona Poyato	Associate Professor
Gonzalo Cerruela García	Associate Professor
Aida de Haro García	Assistant Professor
Juan Carlos Fernández Caballero	Associate Professor

Nicolás Luis Fernández García	Associate Professor
Carlos García Martínez	Associate Professor
Nicolás García Pedrajas	Full Professor
Enrique García Salcines	Assistant Professor
Eva Lucrecia Gibaja Galindo	Associate Professor
Miguel Ángel Gómez Nieto	Full Professor
David Guijo Rubio	Assistant Professor
Pedro Antonio Gutiérrez Peña	Associate Professor
César Hervás Martínez	Full Professor
José María Luna Ariza	Assistant Professor
María Luque Rodríguez	Associate Professor
Irene Luque Ruiz	Full Professor
Francisco José Madrid Cuevas	Associate Professor
Manuel Jesús Marín Jiménez	Associate Professor
Luis Rafael Martínez Carrillo	Assistant Professor
Rafael Medina Carnicer	Full Professor
José María Moyano Murillo	Assistant Professor
Rafael Muñoz Salinas	Full Professor
Domingo Ortiz Boyer	Associate Professor
Juan Antonio Romero del Castillo	Associate Professor
Cristóbal Romero Morales	Full Professor
José Raúl Romero Salguero	Associate Professor
Sebastián Ventura Soto	Full Professor
Enrique Yeguas Bolívar	Associate Professor
Amelia Zafra Gómez	Associate Professor

2.3 Administrative Staff

Miguel Ángel Sanz Gómez	Administrative Manager
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2.4 Research Staff

Javier Barbero Gómez	FPI Grant
Rafael Barbudo Lunar	FPU Grant
Antonio Manuel Gómez Orellana	Grant
Aurora Project Esteban Toscano	FPU Grant
Antonio Rafael Moya Martín-Castaño	FPU Grant
Aurora RamírezQuesada	JA Grant
Francisco Rodríguez Ramírez	FPI Grant
Javier Sánchez Monedero	Distinguished researcher
Víctor Manuel, Vargas Yun	FPU Grant

2.5 Collaborating Students and Honorary Collaborators

Student	María Isabel Jiménez Velasco
Collaborating Student	Tomás Fernández Urbano
Collaborating Student	Fernando Herrera Poch
Collaborating Student	Ricardo Espantaleón Pérez
Student Collaborator	Ana Isabel Navajas Fernández
Honorary Collaborator	Luis Rafael Martínez Carrillo
Honorary Collaborator	David Guijo Rubio
Honorary Collaborator	Rubén Salado Cid
Honorary Collaborator	Carlos Luque Córdoba
Honorary Collaborator	José María Moyano Murillo
Honorary Collaborator	José Luis Ávila Jiménez
Honorary Collaborator	Alfonso Jiménez Vilchez
Honorary Collaborator	Juan Francisco Gómez Fernández
Honorary Collaborator	Fernando Agustín Olivencia Polo
Honorary Collaborator	Luis Toribio Castro
Honorary Collaborator	José Antonio Osuna Zamorano
Honorary Collaborator	Diego Tinedo Rodríguez
Honorary Collaborator	Manuel Mendoza Hurtado

3. Teaching Activity

Next, the teaching activity of the two areas that make up the department is reflected in a series of tables. Said information is extracted from the Teaching Plans of said areas.

Table 1 shows general data on the teaching provided by the Department.

NUMBER OF CENTERS IN WHICH TEACHING IS	6
NUMBER OF DEGREES IN WHICH TEACHING	18
NUMBER OF	2
NUMBER OF SUBJECTS IN WHICH TEACHING IS	63
NUMBER OF REGISTRATIONS BY STUDENTS	3933
TOTAL NUMBER OF HOURS TAUGHT	5430

Table 1. Global data on teaching provided by the Department in the 2020/21 academic year.

The specific teaching activity for the three areas and classified by centers and grades is reflected in tables 2 and 3.

	<i>GRADE</i>	<i>SUBJECTS</i>	<i>NUMBER OF REGISTRATION</i>	<i>HOURS</i>
FACULTY OF SCIENCES	CHEMISTRY	2	181	143
	PHYSICS	6	521	480
	BIOCHEMISTRY	1	54	81
	TOTAL	9	756	704

Table 2 Teaching activity in grades in the area of Mathematical Analysis

	<i>DEGREE</i>	<i>SUBJECTS</i>	<i>NUMBER OF REGISTRATION</i>	<i>HOURS</i>
FACULTY OF	PHYSICAL	2	122	105
	BIOCHEMISTRY	1	47	84
	TOTAL CF	3	169	189
HIGHER POLYTECHNIC SCHOOL OF CORDOBA	ENGINEERING	1	90	168
	ELECTRICAL ENGINEERING	1	8	ELECTRICAL
	ENGINEERING	1	114	168
	INFORMATION ENGINEERING	34	2281	3648
	TOTAL EPSC	37	2513	4068
SCHOOL POLYTECHNIC SUPERIOR OF AGRONOMISTS AND MONTES	FORESTRY ENGINEERING	1	77	26
	AGRI-FOOD AND RURAL ENVIRONMENT ENGINEERING	1	31	44
	DEGREE OF AGROALIMENTARY ENGINEERING	RURAL	AND	
	MIDDLE AND RURAL ENVIRONMENT + FORESTRY ENGINEERING	1	7	
	TOTAL ETSIAM	4	123	76
HIGHER POLYTECHNIC SCHOOL	INGENICIVIL SCIENCE	1	36	42
	TOTAL EPSB	1	36	42
FACULTY OF PHILOSOPHY AND LETTERS	TRANSLATION AND INTERPRETATION	1	100	150
	TRANSLATION AND INTERPRETATION + ENGLISH STUDIES	1	33	
	TRANSLATION AND INTERPRETATION (ENGLISH) + HISPANIC PHILOLOGY	1	12	
	TRANSLATION AND INTERPRETATION (FRENCH) + HISPANIC	PHILOLOGY	5	
	DEGREE IN TOURISM + TRANSLATION AND INTERPRETATION (ENGLISH)	1	19	
	TOTAL FFL	5	169	150
FACULTY OF LABOR SCIENCES	1	65	135	TOTAL
	CT	1	65	135
TOTAL	17	51	3075	4660

TOURISMComputing and Artificial Intelligence.

Teaching in Master's Degrees in the Department's areas can be summarized in Table 4.

<i>AREA</i>	<i>SUBJECT</i>	<i>NUMBER OF ENROLLMENT</i>	<i>HOURS</i>
COMPUTER SCIENCE AND AI	3	102	66
TOTAL	3	102	66

Table 4. Teaching in Master's Degrees in the Computer Science and Intelligence area Artificial.

The Final Degree Projects, the Final Master's Projects and the Theses directed by the department can be summarized in table 5.

<i>AREA</i>	<i>FINAL DEGREE</i>	<i>PROJECTS FINAL MASTER'S DEGREE</i>	<i>THESIS</i>
MATHEMATICAL ANALYSIS	1	0	0
COMPUTER SCIENCE AND AI	74	7	6
TOTAL	75	7	6

Table 5. Final Degree Projects, Final Master's Degree Projects and Theses supervised by the Department's areas (Data for the 19/20 academic year, which are the latest available).

In the section related to Teaching Innovation projects, the coordination/participation of members of the different areas is reflected in table 6.

<i>AREA</i>	<i>COORDINATORS</i>	<i>PARTICIPANTS</i>
MATHEMATICAL ANALYSIS	0	0
COMPUTER SCIENCE AND AI	4	6
TOTAL	4	6

Table 6. Coordination/ Participation in Teaching Innovation Projects. (Data course 19/20, which are the latest available).

4. Research Activity

The research activity will be classified by the research groups to which the professors of the Department are assigned. The information shown has been provided by those responsible for each of the research groups.

4.1 Software, Knowledge and Database Engineering Group

Website: <http://www.uco.es/iscbd/iscbd/>

Responsible: Irene Luque Ruiz.

Members of the CCIA area:

- Miguel Ángel Gómez Nieto.
- Gonzalo Cerruela Garcia.

Research Lines:

- Near Field Communication (NFC) and RFID.
- Intelligent Environments (AmI).
- Pervasive computing.
- Mobile computing.
- Context-awareness.
- Knowledge-based systems.
- Representation of knowledge.
- Models of prediction, clustering and screening.
- Computational Chemistry and Chemometrics.
- QSPR/QSAR.
- Teaching Innovation.

Number of indexed articles: 11.

Number of communications to international conferences: 2.

National research projects: 1.

Autonomous research projects: 1.

R&D&I contracts with companies: 1.

4.2 Learning Group and Artificial Neural Networks

Page web: <http://www.uco.es/grupos/ayrna/>

Responsible: César Hervás Martínez.

Members of the CCIA area:

- Pedro Antonio Gutiérrez Peña
- Juan Carlos Fernández Caballero.
- David Guijo Rubio.
- Antonio Manuel Gomez Orellana.
- Javier Barbero Gómez
- Victor M. Vargas Yun.

Research lines:

- Application of classification models for the area of Aerobiology.
- Application of classification models for the area of Agronomy.
- Application of classification models to carry out Plant Distribution.
- Application of classification models to predict noise in motors.
- Application of classification models to predict the wind.
- Application of classification models for the area of Analytical Chemistry.
- Application of classification models for the Health area.
- Development of evolutionary computing software to execute classification methodologies.
- Development of multi-objective evolutionary algorithms to carry out classification methodologies.
- Development of machine learning methodologies.
- Development of ordinal classification through evolutionary computation.
Carrying out projects for teaching innovation related to intelligent computing.
- Development of applications based on evolutionary computing to solve web data mining problems. Development and study of new base functions for the different nodes of the Artificial Neural Networks.
- Development of Evolutionary Artificial Neural Networks algorithms.
Development of distributed evolutionary computing applications.

Number of indexed articles: 26.

Number of Communications at international Congresses: 8.

Research Projects: 3.

R&D&I contracts with companies: 1.

4.3 Applications of Artificial Vision

Website: <http://www.uco.es/groups/ava/>

Responsible: Rafael Medina Carnicer.

Members of the CCIA area:

- Francisco José Madrid Cuevas.
- Nicolas Luis Fernandez Garcia.
- Enrique Yeguas Bolivar.
- Manuel Jesus Marin Jimenez.
- Angel Carmona Poyato.
- Francisco J. Rodriguez Ramirez.

Research lines:

- Estimation of the camera pose.
- 3D scan.
- Augmented reality.
- Estimation of the human pose.
- Recognition of interactions.
- Recognition for the step.
- Detection and tracking in 3D video.
- Image segmentation, edge detection, shape analysis and polygonal approximations.

Number of indexed articles: 30.

Number of Communications at international conferences: 2.

National Research Projects: 1.

Regional Research Projects: 1.

4.4 Computational Intelligence and Bioinformatics

Website: <http://cib.uco.es/> Person

charge: Nicolás García Stones.

Members of the CCIA area:

- Domingo Ortíz Boyer.
- Juan Antonio Romero del Castillo.
- Aida de Haro Garcia.

Research lines:

- Swarms of classifiers.
- Multi-label classification.
- Unconventional classification.
- Selection of instances and characteristics.
- Chemoinformatics and Bioinformatics Applications.

Number of indexed articles: 6.

Number of communications to international conferences: 1.

National research projects: 1.

4.5 Knowledge Discovery and Intelligent Systems

Website: <http://www.uco.es/kdis/>

Responsible: Sebastián Ventura Soto.

Members of the CCIA area:

- Cristóbal Romero Morales.
- Carlos Garcia Martinez.
- Amelia Zafra Gomez.
- Jose Raul Romero Salguero.
- Eva L. Gibaja Galindo.
- Maria Luque Rodriguez.
- Jose Maria Luna Ariza.
- Antonio Rafael Moya Martin-Castano.
- Aurora Ramirez Quesada.
- Jose Maria Moyano Murillo.
- Lunar Bearded Raphael.
- Aurora Esteban Toscano.

Research lines:

- Data science.
- Big data.
- Machine learning.
- Softcomputing.
- Optimization techniques.

Number of indexed articles: 23.

Number of Communications at national Congresses: 6.

Number of Communications at international Congresses: 3.

Research projects: 2.

R&D&I contracts with companies: 2.

4.6 Exponential Technologies and Ambient Intelligence Group

Web page: [in](#) creation.

Responsible: Enrique García Salcines.

Members of the CCIA area:

- Enrique García Salcines.

Research Lines:

- Blockchain.
- Artificial intelligence.
- Prediction models.
- Internet of Things (IoT) and Ambient Intelligence (AmI).
- Cloud Computing.
- Big data.
- Nanotechnology.
- Virtual and augmented reality.

Number of indexed articles: 7.

National research projects: 1.