



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

Activities Report
Course 2019/2020



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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 2019/20 academic year.

This Department is made up of three areas of knowledge:

- Mathematical Analysis (2 professors and 1 professor).
- Computer Science and Artificial Intelligence (5 professors and 22 professors).
- Systems and Automation Engineering (7 professors)

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

The Department is made up of 6 research groups that throughout the 19/20 academic year published more than 100 articles in indexed journals and participated in 8 national research projects and 1 European research project.

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
José Antonio Herencia González	Associate Professor
Mercedes Marín Beltrán	Associate Professor

Area of Computer Science	
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
Pedro Antonio Gutiérrez Peña	Associate Professor
César Hervás Martínez	Full Professor
José María Luna Ariza	Assistant Professor
María Luque Rodríguez	Assistant Professor
Irene Luque Ruiz	Full Professor
Francisco José Madrid Cuevas	Associate Professor
Manuel Jesús Marín Jiménez	Associate Professor
Rafael Medina Carnicer	Full Professor
Rafael Muñoz Salinas	Associate Professor
Domingo Ortiz Boyer	Associate Professor
Juan Antonio Romero del Castillo	Associate Professor
Cristóbal Romero Morales	Associate Professor
José Raúl Romero Salguero	Associate Professor
Sebastián Ventura Soto	Full Professor
Enrique Yeguas Bolívar	Associate Professor
Amelia Zafra Gómez	Associate Professor

Area of Systems Engineering and Automatic	
Carlos de Castro Lozano	Associate Professor
Luis Manuel Fernández de Ahumada	Assistant Professor
Juan Luis Garrido Castro	Associate Professor
Juan Garrido Jurado	Assistant Professor
Jorge E. Jiménez Hornero	Associate Professor
Rafael David Rodríguez Cantalejo	Associate Professor
Francisco Javier Vazquez Serrano	Associate Professor



2.3 Administration Staff

Miguel Ángel Sanz Gómez	Administrative Manager
José Ángel Gallardo Arroyo	Laboratory Specialist Technician

2.4 Research Staff

Javier Barbero Gómez	FPI Grant
Rafael Barbudo Lunar	FPU Grant
Antonio Manuel Gómez Orellana	Grant
David Guijo Rubio	FPU Grant
Manuel Lara Ortiz	FPU Grant
Antonio Rafael Moya Martín-Castaño	FPU Grant
José María Moyano Murillo	FPU Grant
Francisco Rodríguez Ramírez	FPI Grant
Victor Manuel, Vargas Yun	FPU Grant

2.5 Collaborating Students and Honorary Collaborators

Collaborating Student	Almenara López, Alfonso
Collaborating Student	Almenara López, Antonio
Collaborating Student	Sánchez Arribas, Carlos
Collaborating Student	Gómez Morales, Sergio
Collaborating Student	Jiménez Velasco, María Isabel
Collaborating Student	Luque Córdoba, Carlos
Collaborating Student	Luque Cuesta, Manuel
Collaborating Student	Medel Peinado, Andrés
Collaborating Student	Mellado Baltanás, Raúl
Collaborating Student	Sánchez Arribas, Carlos

Collaborating Student	Ruiz Parrilla, Adrián
Collaborating Student	Ruiz Ruiz, Antonio
Honorary Collaborating	Berral Soler, Rafael
Honorary Collaborating	Castillo Button, Carlos
Honorary Collaborator	Esteban Toscano, Aurora
Honorary Collaborator	Delgado Guerrero, María Luisa
Honorary Collaborator	Díaz Lozano, Miguel
Honorary Collaborator	Garrido Jurado, Sergio
Honorary Collaborator	Gómez Fernández, Juan Francisco
Honorary Collaborator	Gómez Orellana, Antonio Manuel
Honorary Collaborator	Jiménez Vilchez, Alfonso
Honorary Collaborator	Martínez Carrillo, Luis Rafael
Honorary Collaborator	Olivencia Polo, Fernando Agustín
Honorary Collaborator	Osuna Zamorano, José Antonio
Honorary Collaborator	Tinedo Rodríguez, Diego
Honorary Collaborator	Torre López, José de la
Honorary Collaborator	Salado Cid, Ruben
Honorary Collaborator	Reyes Pulpo, Oscar Gabriel

3. Teaching Activity

Next, the teaching activity of the three 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 given	6
Number of Degrees in which teaching is given	18
Number of Master's Degrees in which teaching is given	2
Number of Subjects in which teaching is given	82
Number of Enrollments made by students	4309
Total number of hours taught	6409

Table 1. Global data on teaching provided by the Department in the 2019/20 academic year.



The specific teaching activity for the three areas and classified by centers and grades is reflected in tables 2, 3 and 4.

	<i>Grade</i>	<i>Subjects</i>	<i>Enrolled students</i>	<i>Hours</i>
Faculty of	Physical	2	106	96
	Biochemistry	1	54	84
	Total FC	3	160	180
Higher Polytechnic School of Córdoba	Mechanical Engineering	1	89	168
	Electrical Engineering	1	31	84
	Electronic Engineering	1	107	168
	Computer Engineering	34	2120	3636
	Total EPSC	37	2347	4056
Higher Polytechnic School of Agricultural and Forestry	Engineers Agrifood and Rural	1	75	44
	Forestry Engineering	1	26	32
	Degree Agrifood and Rural Engineering + Oenology	1	13	0
	Degree in Agrifood and Rural Engineering + Forestry Engineering	1	5	0
	Total ETSIAM	4	119	76
Higher Polytechnic School of Belmez	Civil Engineering	1	30	42
	Total EPSB	1	30	42
Faculty of Philosophy and Letters	Translation and Interpretation	1	105	150
	Translation and Interpretation + English Studies	1	32	0
	Translation and Interpretation (eng English) + Hispanic Philology	1	10	0
	Translation and Interpreting (French) + Hispanic Philology	1	4	0
	Degree in Tourism + Translation and Interpreting (English)	1	22	0
	Total FFL	5	173	150
Faculty of Work Sciences	Tourism	1	73	135
	Total CT	1	73	135
Total	17	51	2902	4639

Table 2. Teaching activity in degrees in the area of Computer Science and Artificial Intelligence.



	<i>Degree</i>	<i>Subjects</i>	<i>Enrolled students</i>	<i>Hours</i>
Faculty of Sciences	Chemistry	2	199	132
	Physics	6	526	418
	Biochemistry	1	54	81
	Total	9	779	631

Table 3. Teaching activity in degrees in the area of Mathematical Analysis

	<i>Degree</i>	<i>Subjects</i>	<i>Enrolled students</i>	<i>Hours</i>
Higher Polytechnic School of Córdoba	Mechanical Engineering	1	87	96
	Electrical Engineering	2	60	147
	Electronic Engineering	10	314	612
	Total EPSC	13	461	885

Table 4. Teaching activity in degrees in the area of Systems Engineering and Automation.

Teaching in Master's degrees in the areas of the Department can be summarized in Table 5.

<i>Area</i>	<i>Subjects</i>	<i>Enrolled Students</i>	<i>Hours</i>
Computer Science and AI	3	76	79
Systems Engineering and Automation	6	91	175
Total	9	167	254

Table 5. Teaching in Master's Degrees the areas of Computer Science and Artificial Intelligence and Systems Engineering and Automation.



4. Research Activity

The research activity will be classified according to the different research groups to which the professors of the Department are assigned.

4.1 Software, Knowledge and Database Engineering Group

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

Coordinator: 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: 16.

Number of communications to international conferences: 1.

National research projects: 1.

R&D&I contracts with companies: 1.



4.2 Learning Group and Artificial Neural Networks

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

Coordinator: César Hervás Martínez.

Members of the CCIA area:

- Pedro Antonio Gutiérrez Peña
- Juan Carlos Fernández Caballero.
- David Guijo Rubio.
- Antonio Manuel Gomez Orellana.
- Antonio Manuel Duran Rosal.
- 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.

Number of Communications at national Congresses: 2.

Regional Research Projects: 5.

National Research Projects: 2.



4.3 Artificial Vision Applications

Website: [http:// www.uco.es/grupos/ava/](http://www.uco.es/grupos/ava/)

Coordinator: 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: 17.

National research projects: 1.

4.4 Computational Intelligence and Bioinformatics

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

charge: Nicolás García Pedrajas.

Members of the CCIA area:

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



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Research lines:

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

Number of indexed articles: 9.

National research projects: 1.

Autonomous research projects: 1.

4.5 Knowledge Discovery and Intelligent Systems

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

Coordinator: 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.
- Pedro Gonzalez Mirror.
- Antonio Rafael Moya Martin-Castano.
- Aurora Ramirez Quesada.
- Jose Maria Moyano Murillo.
- Lunar Bearded Raphael.

Research lines:

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

Number of indexed articles: 30.

Number of Communications at national Congresses: 15.

Number of Communications at international Congresses: 4.

National research projects: 2.

European research projects: 1.

R&D&I contracts with companies: 1.



4.6 Computer and Automatic Engineering Projects

Website: <http://www.uco.es/grupos/prinia/>

Coordinator: Francisco J. Vázquez Serrano.

Members of the ISA area:

- Jorge E. Jiménez Hornero.
- Juan Garrido Jurado.
- Rafael David Rodríguez Cantalejo.
- Manuel Lara Ortiz.

Research lines:

- PID controller tuning tool design.
- Design of multivariable control systems.
- Control by decoupling.
- Radiofrequency and positioning systems applied in industrial safety.
- Modeling and control of wind turbines.
- Advanced techniques for modeling and simulation of dynamic systems
- Control of biological processes.
- Modeling and control of HVAC systems.
- Control strategies based on events and networks.
- Educational technologies applied to engineering education.

Number of indexed articles: 4.

Number of Communications at national conferences: 1.

Number of Communications at international conferences: 2.

Regional Research Projects: 1.

R&D&I contracts with companies: 1.

Patents: 1.