

**1. General information****Course:** CALCULUS AND NUMERICAL METHODS**Code:** 42300**Type:** BASIC**ECTS credits:** 6**Degree:** 405 - DEGREE IN COMPUTER SCIENCE ENGINEERING (TA)**Academic year:** 2021-22**Center:** 15 - FACULTY OF SOCIAL SCIENCES AND INFORMATION TECHNOLOGIES**Group(s):** 60**Year:** 1**Duration:** First semester**Main language:** Spanish**Second language:****Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** PHILIPP MANFRED GETTO --- - Group(s): 60

Building/Office	Department	Phone number	Email	Office hours
1.15	MATEMÁTICAS		Philipp.Getto@uclm.es	

2. Pre-Requisites

To achieve the learning objectives of the subject, some basic knowledge and skills are required. These are assumed to be acquired in the educational stages previous to university access. In particular, it is required some basic knowledge of geometry, trigonometry, elementary mathematical operations (powers, logarithms, fractions), fundamentals of functions and notions on differential and integral calculus.

3. Justification in the curriculum, relation to other subjects and to the profession

The computer engineer uses specific engineering techniques together with technical tools obtained through the knowledge of some other subjects as mathematics to develop his or her professional activity.

An important aspect of the course in Calculus and numerical methods is that it helps to increase the capacity for abstraction, rigour, analysis and synthesis characteristic to mathematics and necessary for any other scientific discipline or any field of engineering.

This training allows to participate successfully in the different technologies that integrate informatic engineering, to adapt to technological changes in these areas and even generate them answering to the needs of productive and service branches to achieve the welfare of the society.

This course includes the mathematical fundamentals needed for the correct understanding of other subjects such as Physical fundamentals of Informatics, Statistics and Programming methodology.

4. Degree competences achieved in this course**Course competences**

Code	Description
BA01	Ability to solve mathematical problems which can occur in engineering. Skills to apply knowledge about: lineal algebra; integral and differential calculus; numerical methods, numerical algorithms, statistics, and optimization.
BA03	Ability to understand basic concepts about discrete mathematics, logic, algorithms, computational complexity, and their applications to solve engineering problems.
INS01	Analysis, synthesis, and assessment skills.
INS02	Organising and planning skills.
INS03	Ability to manage information and data.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER01	Team work abilities.
PER02	Ability to work in an international context.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.
SIS01	Critical thinking.
SIS03	Autonomous learning.
SIS04	Adaptation to new scenarios.
SIS05	Creativity.
SIS09	Care for quality.
UCLM02	Ability to use Information and Communication Technologies.
UCLM03	Accurate speaking and writing skills.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

Utilization of programs for symbolic and numerical calculus.

Resolution of fundamental concepts of derivative and integral.

Use of fundamental concepts of derivatives and integrals.
 Enunciation and resolution of optimization problems.
 Implementation and analysis of several numerical methods.

Additional outcomes

6. Units / Contents

Unit 1: Functions

Unit 1.1 Introductions to set theory

Unit 1.2 Real valued functions on a real variable

Unit 1.3 Limits

Unit 1.4 Continuity

Unit 2: Differential calculus

Unit 2.1 Derivation

Unit 2.2 Applications of the derivative, function optimization

Unit 2.3 Local approximation

Unit 3: Integral calculus

Unit 3.1 Riemann integral

Unit 3.2 Computing integrals

Unit 3.3 Improper integrals

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	BA01 BA03	0.9	22.5	N		Teaching of the subject matter by lecturer (MAG)
Individual tutoring sessions [ON-SITE]		BA01 BA03	0.18	4.5	N		Individual or small group tutoring in lecturer's office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	BA01 BA03 INS01 INS02 INS03	2.1	52.5	N		Self-study (EST)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	BA01 BA03 INS01 INS04 INS05 PER01 PER02 PER04 PER05	0.6	15	N		Lab practical preparation (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	BA01 BA03 INS01 INS02 INS04 INS05 PER01 PER02 PER04 PER05 SIS01 SIS03 SIS04 SIS05 SIS09 UCLM02 UCLM03	0.6	15	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO)
Other off-site activity [OFF-SITE]	Other Methodologies	BA01 BA03 INS01 INS02 INS04 PER01 PER02 PER04 PER05	0.9	22.5	Y	N	Group problem solving (RES)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	BA01 BA03 INS04 PER01 PER02 PER04 PER05 SIS01 SIS03 SIS04 SIS05 UCLM02 UCLM03	0.42	10.5	Y	Y	Realization of practicals in laboratory /computing room (LAB)
Other on-site activities [ON-SITE]	Assessment tests	BA01 BA03 INS01 INS04 INS05 PER02 SIS01 SIS05 SIS09 UCLM02 UCLM03	0.15	3.75	Y	Y	Partial test 1 of the first half of the syllabus of the subject (EVA)
Other on-site activities [ON-SITE]	Assessment tests	BA01 BA03 INS04 INS05 PER02 SIS01 SIS05 SIS09	0.15	3.75	Y	Y	Partial test 2 of the second half of the syllabus of the subject (EVA)
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Test	30.00%	30.00%	Partial Test 1. Compulsory activity that can be retaken (rescheduling). To be carried out at the end of the first half of the teaching period
Test	20.00%	20.00%	2nd partial exam. Obligatory activity that can be retaken. In the case of passing the 1st partial exam the 2nd partial exam will be at the date of final exams of the ordinary course. In case of failing the 1st partial, the retaking of the 1st partial and the 2nd partial will be taken in a joint complete exam at the same date.
			In the extraordinary course there will be a complete exam and

			the grades of the partial exams cannot be saved.
Theoretical papers assessment	15.00%	15.00%	Non-compulsory activity that cannot be retaken. To be carried out before end of teaching period
Laboratory sessions	25.00%	25.00%	Compulsory activity that can be retaken. To be carried out during lab sessions
Assessment of active participation	10.00%	10.00%	Non-compulsory activity that cannot be retaken. To be carried out during the theory/lab sessions
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. If the activity consists of several sections, each section may be evaluated separately provided students are informed in writing of this evaluation criterion at the beginning of the academic year. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria). The partial tests will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students.

A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the resit/retake exam call (convocatoria extraordinaria). The oral presentations assessment (non-recoverable activity) will be conserved for the resit/retake exam call even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.

The qualification of the passed activities in any call, will be conserved for the next academic year at the request of the student, provided that it is equal or superior to 5 and the training activities and the evaluation criteria of the subject are not modified in the next academic year.

The failure of a student to attend the partial 1 and partial 2 tests will automatically result in her/him receiving a "Failure to attend" (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Students who cannot regularly assist to the formative activities may apply, at the beginning of the quatrimester to be subject to non continuous evaluation. In the same manner, a student who is realizing the continuous evaluation encounters circumstances

that inhibit him from assisting the activities of the continuous evaluation, may apply for non continuous evaluation. In this case the application should be submitted before the date of the exams of the ordinary course in accordance with a deadline to be clarified

at the beginning of the semester. Students who are subject to non continuous evaluation will be globally evaluated in two annual courses, an ordinary and an extraordinary, with 100% of the competencies evaluated via the systems specified in the row "Non continuous evaluation". In the "Non continuous" mode it is not mandatory

that grades of activities acquired during continuous evaluation are saved

Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities.

Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Individual tutoring sessions [PRESENCIAL]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	15
Other off-site activity [AUTÓNOMA][Other Methodologies]	22.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	10.5
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week	
Unit 1 (de 3): Functions	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	5
Group 42300:	
Initial date: 19-09-2019	End date: 18-10-2019
Group 60:	
Initial date: 19-07-2019	End date: 18-10-2019
Unit 2 (de 3): Differential calculus	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	5
Group 42300:	
Initial date: 24-10-2019	End date: 22-11-2019
Group 60:	
Initial date: 24-10-2019	End date: 22-11-2019
Unit 3 (de 3): Integral calculus	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	7.5

Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	5
Group 42300:	
Initial date: 28-11-2019	End date: 20-12-2019
Group 60:	
Initial date: 28-11-2019	End date: 20-12-2019
Global activity	
Activities	hours
Individual tutoring sessions [PRESENCIAL][]	4.5
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	10.5
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Class Attendance (theory) [PRESENCIAL][Lectures]	22.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Other off-site activity [AUTÓNOMA][Other Methodologies]	22.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	15
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Alfonso García y otros	Cálculo I: Teoría y problemas de análisis matemático en una variable.	CLAGSA		9788492184729	2007	
D. Higham y N. Higham	Matlab Guide	SIAM		978-1-61197-465-2	2007	
R. Larson y B. H. Edwards	Cálculo 1 de una variable	MCGRAW-HILL		9786071502735	2010	
R.G.Bartle and D. R. Sherbert	Introduction to Real Analysis	John Wiley & Sons Inc		978-8126551811	2014	