COURSE DATA

Data Subject	
Code	34163
Name	Numeric calculus
Cycle	Grade
ECTS Credits	9.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	4	First term

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	8 - Numerical methods	Obligatory

Coordination

Name	Department
ARANDIGA LLAUDES, FRANCESC	363 - Mathematics
DONAT BENEITO, ROSA MARIA	363 - Mathematics
MULET MESTRE, PEP	5 - Algebra

SUMMARY

This course, which is located in the first semester of the fourth year of the degree, is compulsory and subsequently taught the subjects of ordinary differential equations, partial differential equations and numerical approximation.

The purpose of this course is to introduce students in learning the concepts, results and basic algorithms of numerical differentiation, numerical methods for solving differential equations and basic numerical methods for partial differential equations.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The necessary basic knowledge for the start of this course will have completed courses in computer science, computer tools, I mathematical analysis, numerical methods for linear algebra and numerical approximation.

OUTCOMES

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Capacity for organization and planning.
- Solve problems that require the use of mathematical tools.
- Ability to work in teams.
- Learn autonomously.
- Possess and understand the mathematical knowledge.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.
- Capacity of abstraction and modeling.
- Participate in the implementation of software and learn mathematical software.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

LEARNING OUTCOMES

To understand, implement and analyze numerical methods of differentiation of functions.

To understand, implement and analyze numerical methods for solving ordinary differential equations.To know and apply the basic methods of numerical solution of differential equations partial . To know the basic techniques of numerical analysis and their translation into algorithms implemented in a programming language . To use mathematical software tools that serve to solve numerical problems.

DESCRIPTION OF CONTENTS

1. Numerical differentiation

. Basic rules.

2. Numerical methods for ODE

3. Introduction to numerical methods for PDE

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	56,00	100
Computer classroom practice	34,00	100
Other activities	11,00	100
Preparation of evaluation activities	34,00	0
Preparing lectures	45,00	0
Preparation of practical classes and problem	45,00	0
TOTAL	**225,00**	

TEACHING METHODOLOGY

The development of the course is structured around three axes: the theory sessions, practical sessions (in the classroom with computer) and tutorials and seminars.

As regards the former, the teacher will develop the main agenda items, using computer classroom where necessary to illustrate a particular point. The student must attend at the time of preparation of the classes scheduled for their optimal use. The practical classes so that students will check the level of acquired knowledge, facing relatively complex problems and analyzing the results. As before, students must prepare such sessions to perform experiments in the schedule.

EVALUATION

Learning assessment of knowledge and skills achieved by students will be continuously done throughout the course and will consist of the following blocks :

1. Theory and practice: since the objectives of the course will focus on the strengthening of computer calculation techniques, this evaluation will be conducted in two stages:

i. Continuous assessment of the practical sessions and reporting, with code results and comments. Carrying out checks on the practical content. (Up to 4 points, ie, 40% of the final grade).

ii. Final evaluation, consisting of a theoretical exam rated up to 5 points, ie 50% of the final grade.

2. Seminars and tutorials: participation in these sessions with a maximum score of 1 point, ie measured, 10% of the final grade.

To pass the course it is required thyat the score of subfields 1.i and 1.ii exceed 40% of the maximum score.

The scores obtained for blocks 1.i and 2 shall be kept in the two announcements of the academic year in which they are made, since its assessment would only be possible throughout the semester and never in the resit.

REFERENCES

Basic

- Referencia b1:J. D. Douglas y R. Burden, Métodos numéricos, 3ª edición, Thomson, 2004.
- Referencia b2:F. Aràndiga y P. Mulet. Càlcul Numèric, Publicacions de la Universitat de València, 2008.
- Referencia b3:G. Strang, Introduction to applied mathematics. Wellesley-Cambridge Press, Wellesley, MA, 1986.

Additional

- Referencia c1:R. J. LeVeque, Finite difference methods for ordinary and partial differential equations. Steady-state and time-dependent problems. SIAM, 2007.
- Referencia c2:A. Quarteroni, F. Saleri, P. Gervasio, Scientific computing with MATLAB and Octave. Third edition, Springer-Verlag, 2010.
- Referencia c3:C. W. Gear, Numerical initial value problems in ordinary differential equations. Prentice-Hall, Inc., 1971.

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Referencia c4:J. D. Lambert, Numerical methods for ordinary differential systems. The initial value problem. John Wiley & Sons, 1991.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available