



## IDENTIFYING DATA

### Mathematics: Mathematics II

Subject	Mathematics: Mathematics II			
Code	V10G060V01203			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	García Cutrin, Francisco Javier			
Lecturers	García Cutrin, Francisco Javier			
E-mail	fjgarcia@uvigo.es			
Web	http://fatic.uvigo.es			
General description	Basic course of line integrals, surface integrals and differential equations.			

## Competencies

Code	
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C14	To recognize and analyze new problems and to propose problem-solving strategies
C18	To transmit writing, verbal and graphical information for audiences of various types
C28	To teach marine science at different levels
D4	Basic computing skills related to the field of study
D8	Teamwork ability
D15	Ability to apply knowledge in practice

## Learning outcomes

Expected results from this subject	Training and Learning Results		
Can know the equations of curves and surfaces most used in the plane and in space. Manage integration in two and three variables in these enclosures as a tool for calculating areas and volumes.	A4 A5	C14 C18 C28	D8 D15
Can understand the concepts of rotational and divergence of a vector field. Understand the importance of line and surface integrals and know how to use them in the study of potential energy and other physical issues.	A4 A5	C14 C18 C28	D8 D15
Can understand, formulate and solve some differential equations of first and second order.	A4 A5	C14 C18 C28	D8 D15
Can use a computer program in solving problems related to integral calculus and differential equations.	A4 A5	C14 C18 C28	D4 D8 D15

## Contents

Topic	
Line Integrals. Conservative fields.	Regular curves. Evaluating line integrals. Work done by a field. Conservative fields. Rotational. Divergence.
Double integrals. Surfaces.	Integration over rectangles. Integration over more general domains. Change of variables in double integrals. Polar coordinates. Green's theorem. Parametric surfaces. Oriented surfaces.

Surface integrals. Triple Integrals	Flux integrals. Stokes's theorem. Triple integrals. Spherical and cylindrical coordinates. Gauss's theorem.
First-order ordinary differential equations	Solving differential equations. Separable equations. Exact equations. Linear equations.
Higher-order linear differential equations	Solving higher-order linear differential equations. Linear differential equations with constant coefficients. General solution of the homogeneous equation. Particular solution of the nonhomogeneous equation.
Laboratory sessions.	Solving integrals and differential equations using computational programs.

## Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	26	26	52
Seminars	18	18	36
Practice in computer rooms	4	2	6
Autonomous troubleshooting and / or exercises	0	10	10
Workshops	4	10	14
Short answer tests	5	5	10
Long answer tests and development	2	8	10
Self-assessment tests	0	4.5	4.5
Troubleshooting and / or exercises	3	4.5	7.5

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

## Methodologies

	Description
Master Session	Exposition of the theoretical bases and resolution of exercises and basic examples.
Seminars	Activities focused on individual work solving problems that allow to extend the contents of the subject. They will be used as a supporting feature to the theoretical classes.
Practice in computer rooms	Learning how to manage a computer program of calculation and graphical representation.
Autonomous troubleshooting and / or exercises	Proposal of activities in which problems and exercises related to the subject has to be solved by students. The students must solve them using the appropriate methods and interpret the results.
Workshops	Specific group work activities

## Personalized attention

Methodologies	Description
Seminars	The students will ask for help to the teacher whenever they consider opportune in order to a better understanding of the subject and to develop successfully the proposed tasks. The individual work of the student will also be monitored.
Practice in computer rooms	The students will ask for help to the teacher whenever they consider opportune in order to a better understanding of the subject and to develop successfully the proposed tasks. The individual work of the student will also be monitored.
Workshops	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation
Tests	Description
Troubleshooting and / or exercises	Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation

## Assessment

	Description	Qualification	Training and Learning Results		
Practice in computer rooms	The students must solve some exercises by the computational program showed at laboratory sessions.	10	A4 A5	C14 C28	D4
Workshops	Participation in all activities, mainly the group ones, proposed by the teachers, whether these to perform inside or outside the classroom.	10	A4 A5	C14 C18 C28	D8
Short answer tests	Partial exams will take place during the course . It will comprise multiple-choice and/or short answer questions.	20	A4	C18	D15

Long answer tests and development	At the end of the course there will be a final test. It could comprise multiple-choice questions, short-answer questions and/or problem questions. A minimum qualification of 30% in this final exam will be required in order to pass.	40	A4 A5	C14 C18 C28	D15
Troubleshooting and / or exercises	To expose or to hand over a series of solved problems by the students during the lessons, under the conditions and the time frame set by the teacher.	20	A4 A5	C18	D15

### Other comments on the Evaluation

- In order to approve the subject, the following requirements will be necessary :
  - To achieve a minimum qualification of 30% in the final exam.
  - To achieve a minimum qualification of 50% as a result of the sum of the marks obtained in each sections.
- Any student who, during the course, participates in two or more evaluation sections of the program can not, in any case, obtain the qualification of NOT PRESENTED.
- Any student who does not pass the subject in June, and intends to do so in July, will keep the grades obtained during the course in each of the evaluation sections, except partial exams (which can compensate with the final exam score) and Final exam must be repeated.

Students are required to take this course in responsible and honest behavior. Any form of fraud (copy or plagiarism) intended to falsify the level of knowledge and skill achieved in any type of test, report or work is considered inadmissible. Fraudulent conduct may involve suspending the course during a full course. An internal record of these actions will be kept so that, in case of recidivism, the rectorate will be requested to open a disciplinary file.

### Sources of information

#### Basic Bibliography

Besada, M.; García Cutrín, J.; Mirás Calvo, M.A.; Quinteiro, C.; Vázquez, C., **Un mar de matemáticas**, Servizo de publicacións da Universidade de Vigo, 2016

Besada, M.; García Cutrín, J.; Mirás, M.; Quinteiro, C.; Vázquez, C., **Matlab: todo un mundo**, Servizo de publicacións da Universidade de Vigo, 2007

Larson, R.; Edwards, B., **Cálculo. Vol 1 e 2.**, 9ª, McGraw-Hill, 2010

Adams, R., **Cálculo**, 6ª, Pearson, 2009

#### Complementary Bibliography

Besada, M.; García Cutrín, J.; Mirás Calvo, M.A.; Quinteiro, C.; Vázquez, C., **Matemáticas á Boloñesa**, Servizo de publicacións da Universidade de Vigo, 2014

Thomas, George B. Jr., **Cálculo, varias variables**, 12ª, Pearson, 2010

Campbel, S.; Haberman, R., **Introducción a las ecuaciones diferenciales**, McGraw-Hill, 1998

Bradley, G.; Smith, K., **Cálculo de varias variables (Volume 2)**, Prentice Hall, 1998

### Recommendations

#### Subjects that it is recommended to have taken before

Mathematics: Mathematics I/V10G060V01103

#### Other comments

It is recommended to have taken the Mathematics course of the second year of high school.