



Teaching Guide

| Identifying Data | | | | | 2019/20 |
|---------------------|--|--------|--|---------|---------|
| Subject (*) | Mathematics | Code | 610G02003 | | |
| Study programme | Grao en Bioloxía | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | Type | Credits | |
| Graduate | 1st four-month period | First | Basic training | 6 | |
| Language | Spanish | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Matemáticas | | | | |
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| Lecturers | Ferreiro Ferreiro, Ana María García Rodríguez, José Antonio Otero Vereá, Jose Luis Prieto Aneiros, Andrés | E-mail | ana.ferreiro@udc.es jose.garcia.rodriguez@udc.es luis.verea@udc.es andres.prieto@udc.es | | |
| Web | | | | | |
| General description | This subject is focused on the study of basic notions of differential calculus and integration, as well as on providing a small introduction to linear algebra and to differential equations | | | | |

Study programme competences / results

| Code | Study programme competences / results |
|------|--|
| A21 | Deseñar modelos de procesos biolóxicos. |
| B1 | Aprender a aprender. |
| B2 | Resolver problemas de forma efectiva. |
| B3 | Aplicar un pensamento crítico, lóxico e creativo. |
| B4 | Traballar de forma autónoma con iniciativa. |
| B5 | Traballar en colaboración. |
| B6 | Organizar e planificar o traballo. |
| B7 | Comunicarse de maneira efectiva nunha contorna de traballo. |
| B8 | Sintetizar a información. |
| B9 | Formarse unha opinión propia. |
| B10 | Exercer a crítica científica. |
| B12 | Adaptarse a novas situacións. |
| B13 | Comportarse con ética e responsabilidade social como cidadán e como profesional. |

Learning outcomes

| Learning outcomes | Study programme competences / results |
|-------------------|---------------------------------------|
| | |



| | | | |
|---|-----|---|--|
| Integration and applications | A21 | B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 B13 | |
| Differentiation and applications | A21 | B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 B13 | |
| Linear algebra and applications | A21 | B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 B13 | |
| Differential equations and applications | A21 | B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 B13 | |



| Topic | Sub-topic |
|---|---|
| ? Differentiation | <ul style="list-style-type: none"> o Basic Rules of Differentiation. o The Chain Rule. o Differentiation Techniques. o L'Hôpital's Rule. Taylor's Theorem. o Applications of Differentiation. o Maxima and Minima. o Optimization Problems. o The Newton-Raphson Method. |
| ? Integration | <ul style="list-style-type: none"> o Integration as Summation. o Fundamental Theorem of Calculus. o Some Basic Integrals. o Integration by Substitution. o Integration by Parts. o Integration of Rational Functions. o Geometrical Applications of Integration. o Numerical Integration. Simpson's Rule. o Improper Integrals. |
| ? Linear Algebra | <ul style="list-style-type: none"> o Systems of Linear Equations o Elementary operations. o The Algebra of Matrices. o Determinants. Basic properties. o The determinant rank. o Eigenvalues and Eigenvectors. o Normal forms for matrices. o Cayley-Hamilton theorem. |
| ? Differential Equations and Applications | <ul style="list-style-type: none"> o First-order Differential Equations. o Separable First-order Differential Equations. o Linear First-order Differential Equations. o Applications of First-order Differential Equations. o Second-order Linear Differential Equations with Constant Coefficients. o Homogeneous Linear Systems with Constant Coefficients. |

| Planning | | | | |
|--------------------------------|---|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student's personal work hours | Total hours |
| Guest lecture / keynote speech | A21 B2 B3 B6 B13 | 32 | 64 | 96 |
| Problem solving | A21 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 | 8 | 18 | 26 |
| Supervised projects | A21 B1 B2 B3 B8 B9 B10 B12 B13 | 8 | 16 | 24 |
| Objective test | B1 B2 B3 B4 B8 B9 B10 B13 | 3 | 0 | 3 |
| Personalized attention | | 1 | 0 | 1 |

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



Methodologies

| Methodologies | Description |
|--------------------------------|--|
| Guest lecture / keynote speech | Concept development and problem solving. |
| Problem solving | A variety of problems (from textbooks and exams of past academic years) will be periodically made available to students on different topics of this course. The students will have to solve them to acquire the required skills to pass this course. |
| Supervised projects | Working on topics proposed by the teacher, a theoretical summary will be presented along with a collection of problems resolved on the corresponding topic. |
| Objective test | Mathematical solution of questions and problems related to the topics of this course. |

Personalized attention

| Methodologies | Description |
|--|--|
| Guest lecture / keynote speech Supervised projects Problem solving | <p>The personalized attention (described in relation to these methodologies) is planned by means of face-to-face meetings between the students and the teachers, which require an active participation of the students.</p> <p>The course of these personalized activities will be indicated specifically for each type of academic activity, and they will be fixed in the semester schedule.</p> <p>The personalized attention for those students with a recognized part-time enrollment, will consist in the solution of exercises (from textbooks and exams of other academic years), which will be periodically available according to the schedule of this course.</p> |

Assessment

| Methodologies | Competencies / Results | Description | Qualification |
|--------------------------------|--|--|---------------|
| Guest lecture / keynote speech | A21 B2 B3 B6 B13 | Questions to the students. | 10 |
| Supervised projects | A21 B1 B2 B3 B8 B9 B10 B12 B13 | Development of specific aspects with examples and solved problems. Competence B3 will be assessed. | 10 |
| Problem solving | A21 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B12 | Delivery of exercises and solved exams. Competences A21 and B2 will be assessed. | 10 |
| Objective test | B1 B2 B3 B4 B8 B9 B10 B13 | Desenvolvemento de cuestións e resolución de problemas da materia | 70 |

Assessment comments



To pass this course it will be necessary to obtain (after adding the qualifications of all the activities) a minimum mark of 50% of the total. To obtain the mark "not presented", it will be sufficient that the students do not participate in the objective test and have not been evaluated in more than 50% of the problem solving and supervised works. To pass the course in the second opportunity, either the above criterion is fulfilled or a mark higher than 50% in the objective test is obtained. Final marks are not kept from successive academic years. However, it is possible to keep the marks of the supervised works of the

previous academic year, if the teacher agrees to this, having the

student previously demanded it..

The students which are part-time enrolled (and so they are granted with an attendance exemption), can be evaluated in a personalised way regarding the methodologies of the lectures, problem solving and supervised works. For those students which are part-time enrolled, it is compulsory to make the objective test, as well as the partial test along the course. For the first and second opportunity the criteria of evaluation for these students is the same as the criterion for full-time enrolled students (where the percentage of dispenses of assistance will be of 80%).

The objective test is equal for all the students.

The priority for obtaining qualifications "with honours", will be for the students that achieve this mark in the first opportunity.

Sources of information

| | |
|----------------------|---|
| Basic | - LARSON (2006). CALCULO. McGrawHill |
| Complementary | - Alfonsa García (). Cálculo I. CLGSA - NEUHAUSER (2004). MATEMÁTICAS PARA CIENCIAS . Pearson - Bradley (). Cálculo. Prentice Hall - Salas / Hille / Etgen (). Cálculus. Reverté - Finney (). Cálculo. Addison-Wesley - Rogawski (2014). Cálculo, una variable. Editorial Reverté |

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

It is convenient to have studied a mathematics course in the last academic year at high school. For those students who have not, the nivelation course offered by the Faculty of Science is strongly recommended.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.