Universidad Zaragoza

Year : 2019/20

30803 - Mathematics

Syllabus Information

Academic Year: 2019/20
Subject: 30803 - Mathematics
Faculty / School: 105 - Facultad de Veterinaria
Degree: 568 - Degree in Food Science and Technology
ECTS: 6.0
Year: 1
Semester: First semester
Subject Type: Basic Education
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions

The course is divided into 30 lectures of one hour each, and 30 hours of practice sessions in the computer classroom.

Regarding lectures, 5 hours are devoted for each of the six sections in which the subject is distributed. The material for each topic is uploaded in advance in a virtual course that students have access throughout the course. Thus, the student can review it in detail before and after the corresponding class. The material is left available to students includes presentations of the theoretical concepts, such as collections of solved problems and proposed for each of them. Thanks to the tools used in the configuration of the virtual course, the materials are neatly organized in each of the six sections in which the subject is divided. In general, we will try to encourage participation in class through a system based on problem-solving learning. Practice sessions are held at computer classroom sessions one or two hours. For each section there will be two two-hour practice sessions which will be made to the approach and resolution models using spreadsheet, algebraic manipulators and specific applications. In addition, each section will end with a practice session of one hour also in computer room, where the student must solve individually similar to those worked both in lectures and in practical situations. As in the theoretical part, the virtual course will host the scripts and support for the implementation of these practices and will be where students must accommodate documents generated in each practice for later evaluation.Face-to-face tutorials as well as e-mail and news offered by the virtual course to maintain permanent contact with students are used.

4.2.Learning tasks

This course is organized as follows:

Section I. Real function of a real variable

- Descriptors: Limits and continuity. Differential calculus in R. Applications of Differential Calculus. Function Graphing. Integration of functions in R and integration techniques. Applications of Integral Calculus.
- Competences:
    - Knowing how to interpret the basic concepts related to real functions of real variable, what a derivative, how it appears in real trouble means, how important is the concept of continuity in real situations.
    - Know how the graph of a real function of real variable and interpret the same within each real context to draw conclusions about the evolution of the process that represents, so that decisions can be made about it.
    - Knowing how to interpret the meaning of the concept of integral beyond its theoretical definition. Knowing the simplest techniques of resolution of Integral Calculus. Knowing the various real situations in which they are integral in the modeling problem. Instrumental generic competences listed above appear implicit in all these competitions.
- Teaching and learning activities: 1 ECTS
    - **Lectures** (5 hours) Participation will be encouraged by means of problem-solving learning.
    - **Practice sessions** in computer room: 2 practice sessions. 2 hours each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**. 14 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation.** A practice session will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

Section II. numerical approximation

- Descriptors: Approximate Solving equations, methods of bisection and Newton-Raphson. Interpolation and approximation, Taylor polynomials, Lagrange method, Newton's method, least squares. Numerical calculation of derivatives and numerical integration methods differences, rectangle rule, midpoint, trapeze and Simpson.
- Competences:
    - To recognize when you can not know the exact solution of an equation and, in that case, know how to choose and apply the best method to find an approximate solution. Knowing how to interpret the approach found in the context of the problem, through discussion and analysis of results.
    - Knowing how to find the best function that approximates a set of experimental data taken in context of the real problem, making the right decision through critical reasoning.
    - Knowing how to recognize situations where a derivative or integral must be solved approximately. Apply the appropriate methods to locate the best approach in each case, interpreting the solution.
    - Knowing when to terminate approximation methods used in this section as the actual context of the problem to be solved, for which a proper application of analytical skills will be used.
    - Knowing master different applications relating to the field of study and use of the Internet as a means of communication and source of information.
- Teaching and learning activities: 1 ECTS
    - **Lectures**: 5 hours (the contents of the descriptors will work). It will seek to encourage participation in class through a system based on problem solving learning.
    - **Practice sessions** in computer room: 2 Practice sessions 2 h each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**: 14 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation**: a practice will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

Section III. Systems of linear equations

- Descriptors: Fundamentals of matrices. Elimination method Gauss-Jordan.
- Competences:
    - Knowing model real problems in terms of matrices. Knowing represent systems of linear equations in terms of matrices and vice versa.
    - Knowing solving a system of linear equations in matrix form using iterative methods.
    - Can analyze which method is most appropriate to address each specific situation, by means of a critical

reasoning.
    - Knowing master different applications relating to the field of study and use of the Internet as a means of communication and source of information.
- Teaching and learning activities: 1 ECTS
    - **Lectures**: 5 hours (the contents of the descriptors will work). It will seek to encourage participation in class through a system based on problem solving learning.
    - **Practice sessions** in computer room: 2 Practice sessions 2 h each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**: 14 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation**: a practice will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

Section IV. First order differential equations

- Descriptors: Classification and exact solving differential equations of the first order.
- Competences:
    - To recognize the different contexts in which the first-order differential equations in the modeling of the problem appear.
    - Know how to apply theoretical knowledge to analyze the situation, classify differential equations and choose the exact resolution method (if any).
    - Knowing master different applications relating to the field of study and use of the Internet as a means of communication and source of information.
- Teaching and learning activities: 1 ECTS
    - **Lectures**: 5 hours (the contents of the descriptors will work). It will seek to encourage participation in class through a system based on problem solving learning.
    - **Practice sessions** in computer room: 2 Practice sessions 2 h each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**: 15 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation**: a practice will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

Section V. Linear Optimization

- Descriptors: Problem of Linear Programming. graphic resolution.
- Competences:
    - Knowing how to interpret the meaning of the concept of optimization in its most general expression as well as the multitude of problems that appears.
    - To recognize the situations in which the linear programming model is presented in different real contexts. Distinguish the most significant cases.
    - Intuitively know how to solve and accurate linear optimization problems where only two variables appear so.
    - Knowing master different applications relating to the field of study and use of the Internet as a means of communication and source of information.
- Teaching and learning activities: 1 ECTS
    - **Lectures:** 5 hours (the contents of the descriptors will work). It will seek to encourage participation in class through a system based on problem solving learning.
    - **Practice sessions** in computer room: 2 Practice sessions 2 h each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**: 15 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation**:va practice will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

Section VI. Statistics

- Descriptors: Descriptive statistics. Analysis of data. Random variable models and Probability Distributions important.
- Competences:
    - Know the basics of descriptive statistics. Know how to make a quantitative analysis of data from a sample

experimentally.
    - Knowing how to interpret the results of the qualitative analysis and subsequent contextualization in the concrete real problem.
    - Knowing understand the meaning of the concept of random variable, from a very practical point of view. Know what the most important Probability distributions are well know to identify with real situations drawn from the collection of experimental data.
    - Knowing master different applications relating to the field of study and use of the Internet as a means of communication and source of information.
- Teaching and learning activities: 1 ECTS
    - **Lectures**: 5 hours (the contents of the descriptors will work). It will seek to encourage participation in class through a system based on problem solving learning.
    - **Practice sessions** in computer room: 2 Practice sessions 2 h each for the approach and resolution models using spreadsheet, algebraic manipulators and specific applications.
    - **Autonomous work and study**: 15 hours of autonomous work by the student. Within these hours possible assistance to individual tutorials are posted.
    - **Evaluation**: a practice will be held in computer room Section at the end of 1 hour, where the student must solve individually similar to those worked both in lectures and in practical situations.

4.3.Syllabus

This course will address the following topics:

- **Section I.** Real function of a real variable
    - Descriptors: Limits and continuity. Differential calculus in R. Applications of Differential Calculus. Function Graphing. Integration of functions in R and integration techniques. Applications of Integral Calculus.
- **Section II.** Numerical approximation
    - Descriptors: Approximate solving equations, methods of bisection and Newton-Raphson. Interpolation and approximation, Taylor polynomials, Lagrange method, Newton's method, least squares. Numerical calculation of derivatives and numerical integration methods differences, rectangle rule, midpoint, trapeze and Simpson.
- **Section III.** Systems of linear equations
    - Descriptors: Fundamentals of matrices. Elimination Gauss-Jordan method.
- **Section IV.** First order differential equations
    - Descriptors: Classification and exact solving differential equations of the first order.
- **Section V.** Linear optimization
    - Descriptors: Problem of Linear Programming. Graphic resolution.
- **Section VI.** Statistics
    - Descriptors: Descriptive statistics. Analysis of data. Random variable models and important Probability Distributions.

4.4.Course planning and calendar

Each session will be held in a temporary space of two weeks and a half, until all 15 teaching weeks of the semester. The distribution of the training activities depend on the schedule assigned to the course, the following distribution being a one possibility:

- Section 1st week: 2 hours of lectures and practice of 2 hours in the computer room by group (all groups conducted this week).
- Section 2nd week: 2 hours of lectures and practice of 2 hours in the computer room by group (all groups conducted this week).
- Media Week Section: 1 h of lecture and individual practical assessment of 1 h in computer room per group (all groups conducted in this midweek).

Logically, all the weeks devoted to each Section may not coincide with the calendar weeks, due to the emergence of the middle weeks.

Further information concerning the timetable (http://veterinaria.unizar.es/horarios1cta), classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle (http://moodle.unizar.es/).

4.5.Bibliography and recommended resources

Resources

All information and materials on the subject will be available in updated form in a virtual course that students have access throughout the course. Moreover, most of both theoretical and practical materials are also fully available (both for use as a download) completely open in the portal OCW University of Zaragoza from the following address: http: //ocw.unizar. en / ocw / course / view.php? id = 15

TEXTBOOKS:

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4. [Bloque IV (Ecuaciones diferenciales de primer orden)] - Zill, Dennis G. Ecuaciones diferenciales con aplicaciones / Dennis G. Zill; traductores [de la 3a. ed. inglesa], Eduardo M. Ojeda Peña, Álvaro Cofré Matta ; revisores técnicos, Francisco Paniagua Bacanegra ... [et al.] . [2a ed.] México: Grupo Editorial Iberoamérica, cop. 1988
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FURTHER READING:

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4. [Bloque I (Función real de variable real), II (Aproximación numérica)] - Burgos Román, Juan de. Cálculo infinitesimal: 202 problemas útiles / Juan de Burgos Román. Ed. Estudiante Madrid [etc.]: García-Maroto, D.L. 2007
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