VNIVERSITAT DE VALÈNCIA

Course Guide
34744 Mathematics II

COURSE DATA

Data Subject	
Code	34744
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1401 - Degree in Chemical Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1401 - Degree in Chemical Engineering	1 - Mathematics	Basic Training

Coordination

Name	Department
MARCO MONTORO, LUIS	363 - Mathematics

SUMMARY

This course develops the classic content of Mathematical Analysis: Differential calculus in several variables, ordinary differential equations, complex functions and Fourier series and Fourier and Laplace transforms. Addressed to engineering students, with contents based on relevant applications, maintaining a consistent order in the presentation and development of different concepts to be introduced.

Lectures will be taught in Spanish, and practical sessions as indicated in the course data, which is available in the web page of the degree.

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 contents of the course Mathematics I, which is taught in the first semester.

OUTCOMES

1401 - Degree in Chemical Engineering

- G3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering.
- B1 - Ability to solve a wide range of mathematical problems that may arise in engineering. Ability to apply the acquired knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial derivatives, numerical methods, numerical algorithms, statistics and optimisation.

LEARNING OUTCOMES

This course allows for the following learning outcomes:

- The knowledge of basic concepts in mathematics (B1, G3, G4).
- Solving engineering problems by applying concepts in advanced math (B1, G3, G4).
- Being able to understand the mathematical formalisms that may arise in engineering (B1, G3, G4).
- Modeling physical phenomena using mathematical tools (B1, G3, G4).
- Interpret the mathematical results applied to the physical world (B1, G3, G4).

To complement the above results, this subject also permits to acquire the following skills:

- Understand the concept of partial derivative. Using the chain rule for the derivation of composite and implicit functions.
- Manage the elementary methods for solving ordinary differential equations and systems.
- Understand the concept of series and deal with some convergence criteria. Representation of some complex functions in power series and understand the concept of convergence region.
- Represent functions in the frequency domain using Fourier series and transforms.

DESCRIPTION OF CONTENTS

1. Differential calculus of functions of several variables.

Partial derivatives, directional derivatives. Derivation of composite functions (chain rule). Implicit differentiation. Curves and surfaces.

Schedule: 5 h theory, 3 h problems, laboratory 2 h.

2. Multiple integration.

Integral functions of two and three variables. Integration by change of variables. Fundamental theorems of integral calculus.

Schedule: 4 h theory, 3 h problems, laboratory 2 h.

3. Ordinary differential equations.

Equations of separable variables, homogeneous, linear equations of first order, linear differential equations of higher order with constant coefficients. Systems of differential equations. Laplace Transformation. Application of the Laplace transform to solve differential equations and systems.

Schedule: 4 h theory, 3 h problems, laboratory 2 h.

4. Sequences and series. Complex variable functions.

Sequences and series of complex numbers. Series convergence criteria. Complex variable functions. Power series.

Schedule: 5 h theory, 4 h problems, laboratory 2 h.

5. Series and Fourier transform.

Fourier series. Trigonometric complex form. Fourier series representation of periodic functions. Fourier transform, investment properties and reversal formula.

Schedule: 5 h theory, 6 h problems, laboratory 2 h.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	20,00	100
Laboratory practices	10,00	100
Study and independent work	15,00	0
Preparation of evaluation activities	27,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	30,00	0
TOTAL	**147,00**	

TEACHING METHODOLOGY

In the lectures, the lecturer will gradually introduce mathematical concepts and their use mainly through examples. Standard procedures for solving problems related to the topic will be exposed as well (B1, G3, G4).

Practical classes will be oriented to a deeper understanding of the theoretical concepts by means of the students' own work. The way to achieve active Student participation may vary depending on the number of students, but it will balance the Student individual work and the open discussion of selected exercises through presentation by the students and further analysis (B1, G3, G4).

Laboratory sessions will be performed in reduced groups at the computer laboratories. The students will work individually or in couples in the solution of problems related to the theoretical and practical course contents, assisted by symbolic calculus software. The students will follow a guide supplied by the teachers (B1, G3, G4).

EVALUATION

The assessment is carried out by:

- A final examination, theoretical and practical (B1, G3, G4), with a weight of 50% on the final grade. This exam is recoverable.
- Continuous Assessment: The weight of this part will be 50% on the final grade. It will assess the ongoing work of the student through two periodic controls (B1, G3, G4), which represent a 10% of the final grade each, one or more evaluation controls (B1, G3, G4) for the laboratory sessions, which globally represent a 20% on the final grade, and the assessment of the practice sessions (B1, G3, G4), which represents a 10% on the final grade and will be done through he attendance and participation of the student in the practice sessions and individual work through some problems or deliverables specified by the teacher.

The continuous assessment tests are not recoverable. Anyway, if for some justified reason it was impossible to fully perform the continuous assessment its weight will decrease proportionally, increasing

the weight of the final exam up to a maximum of a 70%, to complete the 100% of the final grade.

It is mandatory for the student to pass the course to get a minimum grade of 3,5 over 10 points in the final exam.

The final grade will be computed through the following formula, provided the revious requirements are satisfied:

NF = NE * PE + NA * PA

where:

NF = Final grade of the course

NE = Grade of the final exam, over 10 points.

PE = Weighting factor of the final exam, with a value equal to 0.5 if the continuous assessment is completely done, a vallue equal to 0.6 if any of the two controls has not been delivered by the student, or if the practice cannot be assessed, and a value of 0.7 otherwise.

NA = Grade of the continuous assessment, over 10 points.

PA = Weight of the continuous assesment, with the value that results of ading the relative weights of the continuous assessment tests delivered by the student.

In any case, the assessment will be done in accordance with the Reglament d'Avaluació i Qualificació de la Universitat de València per a Títols de Grau i Màster (http://links.uv.es/7S40pjF).

REFERENCES

Basic

- G. James . Matemáticas avanzadas para la ingeniería. Segunda Edición. Pearson Education. (2002) ISBN: 970-26-0209-2
- E. Kreyszig. Matemáticas avanzadas para la ingeniería. Limusa Wiley (2003) ISBN: 968-18-5310-5
- J.E. Marsden, A.J. Tromba. Cálculo vectorial. Cuarta Edición. Pearson Educación (1998) ISBN: 968-444-276-9
- M. Molero, A. Salvador, T. Menárguez, L. Garmendia. Análisis matemático para ingeniería. Pearson Education. (2007) ISBN: 978-84-8322-346-8.
- J. Stewart. Cálculo multivariable. Thomson Learning (2003) ISBN: 970-686-123-8

Additional

- G. L. Bradley y K. J. Smith, Cálculo de varias variables. Vol. II. Prentice Hall Iberia (1998) ISBN: 84-89660-77-8.

ADDENDUM COVID-19

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

Contents

The contents initially established in the Course Guide are maintained.

Workload and planning of teaching

Workload:

The activities described in the Course Guide with their time dedication are maintained.

Planning of teaching:

The resources used in the theoretical and practical sessions allow to continue with the planned teaching scheduled, both in case of face-to-face teaching as well as if one must resort to virtual teaching.

Teaching methodology

If it is required by the sanitary situation, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaption to each subject, establishing the specific conditions in which it will be developed, taking into account the actual enrolment data and the space availability.

Evaluation

The evaluation system described in the Course Guide in which the activities have been specified as well as their contribution to the final grade of the subject is maintained.

If there is a closure of the facilities for sanitary reasons that affect the development of any face-to-face evaluable activity, it will be replaced by a test/activity of a similar nature that will be carried out in virtual mode using the computer tools licensed by the University of Valencia. The contribution of each evaluable activity to the final grade of the course will remain unchanged, as established in this guide.

References

The recommended references in the Course Guide are maintained as long as the Library Service is available in person to all students. Otherwise, notes, slides, problems and/or other virtual sources, supplementing the material normally provided, will be available at the Virtual Classroom. Moreover, alternative bibliography will be also provided, which will be available online through the Library Service.