COURSE DATA

Data Subject	
Code	34744
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

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

1. Continguts

Es mantenen els continguts inicialment programats a la guia docent.

2. Volum de treball i planificació temporal de la docència

Es manté el pes de les diferents activitats que sumen les hores de dedicació en crèdits ECTS marcades en la guia docent original.

Es mantenen les sessions programades en les mateixes dates i hores amb la mateixa durada.

3. Metodologia docent

Aquesta assignatura té tres parts diferenciades: teoria, resolució de problemes i laboratoris en aula informàtica.

Les classes de teoria es realitzen mitjançant videoconferència síncrona BBC. Es pugen materials en format pdf i vídeo a l'Aula Virtual amb els continguts teòrics explicats, exemples pràctics resolts i exercicis proposats amb solucionari per a que els alumnes els resolguen per a practicar.

Les classes de resolució de problemes es realitzen cada setmana mitjançant videoconferència síncrona BBC i/o fòrum a l'Aula Virtual on les professores plantegen un conjunt de problemes a resoldre i resolen dubtes dels alumnes.

Les classes de laboratoris es realitzaran mitjançant videoconferència síncrona BBC i/o fòrum a l'Aula Virtual a les dates i hores inicialment previstes. Es prepararan vídeos explicatius de les sessions que els estudiants poden consultar. En acabar la sessió, els alumnes enviaran els exercicis del laboratori que hagen realitzat i el professor revisarà aquells que presenten algun problema. Aquesta entrega també servirà com a justificant d'assistència al laboratori.

Les professores estan disponibles per a tutories via mail, fòrum i/o videoconferència. Els alumnes disposen d'un fòrum a l'Aula Virtual per a preguntar dubtes genèrics de l'assignatura.

4. Avaluació

L'avaluació es portarà a terme mitjançant:

- Un examen final teòric-pràctic, amb un pes del 50% sobre la nota final.

En aquest examen es proposaran diversos problemes a resoldre emprant l'eïna qüestionari o tasca de l'Aula Virtual. Es proposaran els problemes d'un en un, proporcionant temps suficient per a resoldre'ls, segons la dificultat del problema. Els alumnes hauran de pujar a l'Aula Virtual un document amb la resolució detallada del problema escrit a mà. Una vegada exhaurit el temps de resolució de l'exercici i/o pujada la resolució del mateix, es podrà accedir al següent exercici de l'examen, sense opció de retrocedir.

Si el dia de l'examen algun alumne té problemes per a pujar els documents a l'Aula Virtual, els podrà enviar via mail, sempre dins del temps de resolució de cada exercici. Si alguna persona no disposa dels mitjans per a establir aquesta connexió i accedir a l'Aula Virtual, deura contactar amb la professora responsable per correu electrònic en el moment de publicació d'aquesta addenda a la guia docent.

- Avaluació contínua: El pes d'aquesta part serà del 50% de la nota final.

Es valorarà el treball continu de l'alumne mitjançant dos controls periòdics no recuperables, que representen un 10% de la nota cadascún d'ells. El segon control tindrà la mateixa estructura que el primer. Si no es realitza un o els dos controls, el pes de l'avaluació continua disminuirà proporcionalment, augmentant el pes de l'examen fins un màxim del 70% per completar el 100% de la nota, sempre que siga possible.

L'avaluació de les sessions de laboratori, que representen globalment un 20% de la nota final, es durà a terme mitjaçant l'entrega via mail o Aula Virtual d'uns exercicis proposats pel professor en un temps limitat. Els exercicis seran similars als que es realitzen en classe i els estudiants els tindran que resoldre emprant el programa Mathematica. Aquesta nota només serà vàlida per als exàmens de primera i segona convocatoria del curs 2019/2020.

L'avaluació de les pràctiques, que representa un 10% de la nota, es realitzarà tenint en compte la participació de l'estudiant en la resolució de problemes a les sessions de pràctiques, tant a les sessions presencials com virtuals i l'interés mostrat preguntant dubtes.

La segona convocatòria consistirà en la recuperació de la prova de coneixements teórico-pràctics, que es realitzarà i s'entregarà de la mateixa forma que a la primera convocatòria.

S'haurà de tenir almenys 3.5 punts (sobre 10) en l'examen final per aplicar aquests percentatges. Si no és així, no es considerarà superada la matèria.

5. Bibliografia

La bibliografia recomanada es manté.