

[GJC102] FOUNDATIONS OF ELECTRICAL ENGINEERING

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING		Subject	?	
Semester	1	Course	1	Mention / Field of specialisation	
Character	OPTIONAL	Modality	Face-to-face	Language	CASTELLANO/EUSKARA
Plan	2020	Hours/week	5	Total hours	90 class hours + 60 non-class hours = 150 total hours
Credits	6				

PROFESSORS

CANALES SEGADE, JOSE MARIA

CABEZUELO ROMERO, DAVID

REQUIRED PREVIOUS KNOWLEDGE

Subjects

(No specific previous subjects required)

Knowledge

(No previous knowledge required)

SKILLS

VERIFICA SKILLS

SPECIFIC

GJCE02 - To understand and master basic concepts from the general laws of mechanics, thermodynamics, fields and waves and electromagnetism, applying them to engineering problems.

GENERAL

GJCG03 - Addressing and optimising activities of assembly, commissioning, assistance and maintenance of facilities, machinery, and industrial mechatronic systems

CROSS

GJCTR2 - To be able to understand and apply knowledge to problem solving in complex work situations or specialised and professional environments calling for creative and innovative ideas, using self-developed arguments and procedures;

BASIC

G_CB5 - To have developed learning abilities required to embark on subsequent studies with a high level of autonomy.

LEARNING RESULTS

RGJ181 They communicate, search and structure written information: they write a clear and concise project report following the criteria established in the guide for written reports using the appropriate software.

LEARNING ACTIVITIES

Development, writing and presentation of memorandums, reports, audiovisual material, etc.
Relating to projects/POPBLs carried out individually or in teams

CH

1 h.

NCH

2 h.

TH

3 h.

EVALUATION SYSTEM

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

W

100%

MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: Revision and correction of the written report of the semester project

CH - Class hours: 1 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 3 h.

RGJ182 They communicate, search and structure orally the information correctly: they make a clear and concise oral presentation and defense of the project, considering the aspects gathered in the oral communication guide and using the proper software approp

LEARNING ACTIVITIES

Development, writing and presentation of memorandums, reports, audiovisual material, etc.
Relating to projects/POPBLs carried out individually or in teams

CH

1 h.

NCH

3 h.

TH

4 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence 100%

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: With the oral presentation of the project of the second semester

CH - Class hours: 1 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 4 h.

RGJ191 They use the right methodology to find solutions to problems and to develop projects: analyse problems properly, look for meaningful information to face them and propose solutions.

LEARNING ACTIVITIES

CH

NCH

TH

Development, writing and presentation of memorandums, reports, audiovisual material, etc.
 Relating to projects/POPBLs carried out individually or in teams

4 h.

4 h.

EVALUATION SYSTEM

W

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

100%

MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: With the project of the second semester

CH - Class hours: 4 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 4 h.

RGJ192 They use the right methodology to find solutions to problems and to develop projects: analyse problems properly, look for meaningful information to face them and propose solutions.

LEARNING ACTIVITIES

CH

NCH

TH

Development, writing and presentation of memorandums, reports, audiovisual material, etc.
 Relating to projects/POPBLs carried out individually or in teams

4 h.

4 h.

EVALUATION SYSTEM

W

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

100%

MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: With the project of the second semester

CH - Class hours: 4 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 4 h.

RGJ1114 They identify, examine and calculate oscillation and wave phenomena

LEARNING ACTIVITIES

CH

NCH

TH

Development, writing and presentation of memorandums, reports, audiovisual material, etc.
 Relating to projects/POPBLs carried out individually or in teams

2 h.

1 h.

3 h.

Individual study and work, tests and evaluations and check points

2 h.

3 h.

5 h.

Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

6 h.

6 h.

Individual and team exercises

4 h.

7 h.

11 h.

Workshops, discussions, seminars, case studies, role plays, etc

2 h.

2 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	90%	Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	10%	Comments: Correction and re-delivery of the document

CH - Class hours: 16 h.
NCH - Non-class hours: 11 h.
TH - Total hours: 27 h.

RGJ1115 They solve problems and operations in the field of electromagnetism, correctly relating the physical quantities involved

LEARNING ACTIVITIES	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	8 h.	7 h.	15 h.
Individual study and work, tests and evaluations and check points	2 h.	8 h.	10 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	14 h.		14 h.
Individual and team exercises	8 h.	7 h.	15 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Individual written and oral tests to assess technical skills of the subject	90%	Individual written and oral tests to assess technical skills of the subject
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	10%	Comments: Final mark: written second-chance exam (75%) + exam (25%). Laboratory practices and autoevaluations will be made-up by on-going evaluation

CH - Class hours: 32 h.
NCH - Non-class hours: 22 h.
TH - Total hours: 54 h.

RGJ1116 They analyse and resolve DC and AC circuits

LEARNING ACTIVITIES	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	4 h.	4 h.	8 h.
Individual study and work, tests and evaluations and check points	3 h.	6 h.	9 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	11 h.		11 h.
Individual and team exercises	9 h.	12 h.	21 h.
Individual or team workshop and/or lab practice	5 h.		5 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Individual written and oral tests to assess technical skills of the subject	80%	Individual written and oral tests to assess technical skills of the subject
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	10%	Comments: Final mark: written second-chance exam (75%) + exam (25%). Laboratory practices and autoevaluations will be made-up by on-going evaluation
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	10%	

CH - Class hours: 32 h.
NCH - Non-class hours: 22 h.
TH - Total hours: 54 h.

CONTENTS

1. Electrostatic

Electric charge. Coulomb's Law
Electric field and flux: Gauss' Law
Electrostatic energie. Electric potential
Electrostatic energy storage: Capacitances

2. Direct current circuits

Electric circuit and electrical variables: voltage, current
Resistance. Ohm's Law
Joule's effect. Electric power
Simple direct current circuits
Resolution of complex DC circuits: Kirchhoff's Laws, the theorem of Thévenin, Principal of superposition

3. Waves and oscillation phenomena

Sine wave form and its parameters

Harmonics

4. Alternating current circuits

AC single-phase mains
Analysis of simple alternating current circuits in a permanent regime
Complex impedance. Phasors and vectorial diagrams
Resolution of alternating current circuits by complex numbers
Active, reactive and apparent power. Power factor
Power factor correction

5. Electromagnetism

Magnetic field and the electric current: Biot and Savart's law.
Magnetic flux and flux density
Magnetic circuits
Electromagnetic induction: Faradays law
Magnetic energy storage: Inductance

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Moodle Platform
Lab practical training
Slides of the subject

Bibliography

F.W. Sears, M.W. Zemansky, H.D. Young, R.A. Freedman. Física Universitaria (2º vol.). 13ª ed. México: Pearson Ed. 2013. ISBN:978-607-322-190-0
Joseph A. Edminister, Mahmood Nahvi. Circuitos eléctricos. Mc Graw Hill
P.A. Tipler, G. Mosca. Física para la ciencia y la tecnología (2º vol.). Barcelona:Reverté. 2010. ISBN: 978-84-291-4433-8
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