[MHK201] ELECTRIC TECHNOLOGY

GENERAL INFORMATION

Studies	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING			**Subject**	?
Semester	1	**Course**	1	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	4,5	**Hours/week**	2.5	**Total hours**	45 class hours + 67.5 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

PROFESSORS

EGUREN ALUSTITZA, IMANOL

RIVERA TORRES, CHRISTIAN ALEJANDRO

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	[!] *Resolución de circuitos eléctricos* [!] *Controladores básicos* [!] *Electrotécnia. Máquinas Eléctricas* [!] *Fisica eléctrica: Corriente continua y Corriente alterna*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
MHRA01 - To know, analyze and design electrical energy generation, transportation and distribution systems		x		2,72
MHRA07 - To design electronic and industrial instrumentation systems		x		1,3
MHRA27 - To demonstrate the ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social, health and safety, environmental, economic and industrial implications and responsibilities		x		0,08
MHRA28 - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way		x		0,16
MHRA30 - To work with people, involving and directing them in a dynamic aimed at a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics that it requires (quality, deadlines,...), assuming responsibility for the decisions made		x		0,08
MHR126 - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		x		0,08
MHR129 - To possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous		x		0,08
			Total:	**4,5**

KC: Knowledge or Content / SK: Skills / AB: Abilities

ENAEE LEARNING RESULTS	ECTS
ENA124 - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree.	0,6
ENA126 - Knowledge and comprehension: Critical knowledge of the broad multidisciplinary context of engineering and the interrelations existing between the knowledge of the different fields.	0,3
ENA130 - Analysis in engineering: Ability to identify, formulate and solve engineering problems in emerging areas of their speciality.	0,6
ENA132 - Engineering projects: Ability to project while applying the knowledge and cutting-edge understanding of their engineering speciality.	0,5
ENA135 - Research and innovation: Ability to consult and apply codes of good practices and security in their speciality.	0,5
ENA137 - Research and innovation: Ability to investigate the application of the most advanced technologies in their speciality.	0,5
ENA139 - Practical application of engineering: Practical skills, such as the use of computer tools to solve complex problems, carry out complex engineering projects, and design and guide complex investigations.	0,5
ENA140 - Practical application of engineering: Complete knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations.	0,5
ENA142 - Practical application of engineering: Knowledge and comprehension of the social, health and safety, environmental, economic and industrial implications of engineering practice.	0,5
Total:	**4,5**

SECONDARY LEARNING RESULTS

RMH111 **[!]** ***Formula las relaciones entre magnitudes mecánicas y electromagnéticas en máquinas eléctricas***

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		14 h.	14 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.		1 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	7 h.	4 h.	11 h.
Practical work in workshops and/or laboratories, individually and/or in teams	4 h.	8 h.	12 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	30%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	70%	

CH - Class hours: 18 h.
NCH - Non-class hours: 26 h.
TH - Total hours: 44 h.

RMH113 **[!]** ***Define, diseña y analiza los sistemas electrónicos de conversión de la energía eléctrica***

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		10 h.	10 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.		1 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	4 h.		4 h.
Carrying out exercises and solving problems individually and/or in teams	4 h.	4 h.	8 h.
Practical work in workshops and/or laboratories, individually and/or in teams	2 h.	12 h.	14 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	60%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	40%	

CH - Class hours: 11 h.
NCH - Non-class hours: 26 h.
TH - Total hours: 37 h.

RMH112 **[!]** ***Define los parámetros fundamentales de la generación de energía eléctrica, así como su transporte y distribución***

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		6 h.	6 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.		1 h.
Computer simulation exercises, individually and/or in teams	2 h.	2,5 h.	4,5 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	4 h.	4 h.	8 h.
Practical work in workshops and/or laboratories, individually and/or in teams	3 h.	3 h.	6 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	30%
Individual written and/or oral tests or individual coding/programming tests	70%

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

CH - Class hours: 16 h.
NCH - Non-class hours: 15,5 h.
TH - Total hours: 31,5 h.

CONTENTS

1-BASIC CONCEPTS OF ELECTRICITY1.1 Direct Current1.2 Single Phase Alternating Current1.3 Three-phase Alternating Current2-ELECTRICAL MACHINES2.1 Transformers2.2 Direct Current Machines.2.3 Alternating Current Machines. Alternating Synchronous and Asynchronous Machines3-POWER CONVERTERS3.1 Rectifiers. Non diode-controlled rectifiers3.2 DC/DC converters. Chopper3.3 DC/AC converters. Inverters4-GENERATION OF ELECTRICAL ENERGY4.1 Synchronous Alternator. Island Operation and Connected to an Infinite Grid.4.2 Permanent Magnet Generators.4.3 Asynchronous Generators4.4 Solar Energy5-TRANSPORT AND DISTRIBUTION OF ELECTRICAL ENERGY5.1 Description of lines5.2 Line modeling5.3 Reactive Compensation

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

- Moodle Platform
- Slides of the subject
- Specific Master Software
- Lab practical training

Bibliography

Fraile, J. Máquinas Eléctricas. Mc Graw Hill. 5ª Edición. 2003. ISBN84-481-3913-5

Wildi, T. Máquinas Eléctricas y Sistemas de Potencia. Prentice Hall. 6ª Edición. 2007. ISBN 970-26-0814-7

Barrado, A. Problemas de Electrónica de Potencia. Pearson. Prentice Hall. 2007. ISBN 978-84-205-4652-0