



IDENTIFYING DATA

Electrical machines

| | | | | |
|---------------------|---|-----------|------|------------|
| Subject | Electrical machines | | | |
| Code | V12G363V01605 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 3rd | 2nd |
| Teaching language | | | | |
| Department | | | | |
| Coordinator | Novo Ramos, Bernardino | | | |
| Lecturers | Novo Ramos, Bernardino | | | |
| E-mail | bnovo@uvigo.es | | | |
| Web | | | | |
| General description | | | | |

Skills

| | |
|------|--|
| Code | |
|------|--|

Learning outcomes

| | |
|------------------------------------|-------------------------------|
| Expected results from this subject | Training and Learning Results |
|------------------------------------|-------------------------------|

Contents

| | |
|---|--|
| Topic | |
| UNIT I: INTRODUCTION TO THE ELECTRICAL MACHINES | <p>I-1 Electromagnetic and electro-mechanic fundamental laws. General behaviour notes: Physical arrangement of the electrical machines. Types of machines. Losses. Energy balance. Efficiency. Heating. Cooling. Rated power. Insulation types. Degrees of mechanical protection and construction types. Nameplate.</p> <p>I-2 Usual construction: Magnetic poles. Windings.</p> <p>I-3 M.M.F.s and E.M.F.s inside the machine: Fields generated with concentrated and distributed windings. Rotating magnetic field. Winding factor</p> |
| UNIT II: INDUCTION MOTORS (ASYNCHRONOUS) | <p>II-1 Three-phase induction machine</p> <p>Construction characteristics. Operating principles. Electrical equivalent circuit. Powers and torques. Electrical tests. Energy balance and efficiency. T-s curve. Operation modes. Starting methods and speed control.</p> <p>AC motor protection and control switchgear.</p> <p>II-2 Single-phase induction motor</p> <p>Construction characteristics. Operating principles. Electrical equivalent circuit. Starting methods.</p> |
| UNIT III: SYNCHRONOUS MACHINES (GENERATORS) | <p>UNIT III: SYNCHRONOUS MACHINES (GENERATORS)</p> <p>Construction characteristics. Operating principles. Armature reaction. Salient poles and cylindrical rotor machines. Electrical equivalent circuit. Stand-alone and grid-connected behaviours. Synchronous motor: Characteristics and uses.</p> |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Problem solving | 8 | 16 | 24 |
| Laboratory practical | 10 | 16 | 26 |
| Lecturing | 32.5 | 65 | 97.5 |
| Objective questions exam | 1 | 0 | 1 |
| Problem and/or exercise solving | 1.5 | 0 | 1.5 |

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

| | Description |
|----------------------|--|
| Problem solving | Student will be required to work in groups to solve and present some proposed ac machines problems. This activity could be done using the "virtual office" if presentality is not possible due to the COVID19 University self-quarantine policies |
| Laboratory practical | Typical lab session in the Electrical Machines laboratory. They can be done online (using some machine simulation software) if presentality is not possible due to the COVID19 University self-quarantine policies |
| Lecturing | Typical lecture. Either presential or using the "virtual office" facility. The place will depend on the COVID19 University self-quarantine policies |

Personalized assistance

| Methodologies | Description |
|-----------------|---|
| Lecturing | Course-related discussions, asking for extra help, seeking clarification of material presented in class and following up on aspects of the class you find compelling can be done during the "Office Hours". They can be presential or "virtual". The student should ask the lecturer (e-mail) in order to decide the day and the time |
| Problem solving | Course-related discussions, asking for extra help, seeking clarification of material presented in class and following up on aspects of the class you find compelling can be done during the "Office Hours". They can be presential or "virtual". The student should ask the lecturer (e-mail) in order to decide the day and the time |

Assessment

| | Description | Qualification Training and Learning Results |
|-----------------|---|---|
| Problem solving | The assessment method will be a numerical resolution of some exercises of electrical machines A minimum mark of 40% will be required in this part Part of this qualification percentage could be obtained with some continuous evaluation, depending on the lecturer. (5/40). Student will be properly informed if this option is activated. | 40 |
| Lecturing | The assessment method will be a test, to be done individually without the use of any information source. There will be one unique test for the whole subject, and it will cover not only the theoretical lessons but the practical lab tests. A minimum mark of 40% will be required in this part Part of this qualification percentage could be obtained with some continuous evaluation in the lab lessons, depending on the lecturer. (10/60). Student will be properly informed if this option is activated. | 60 |

Other comments on the Evaluation

To pass the subject a minimum of 5/10 will be required (result of the sum of the 2 parts)

If the student final mark is bigger than 5, but the minimum in each part is not reached, the overall given mark will be 4.0 (FAILED)

Commitment: An student ethical behaviour is expected. If a non-ethical behaviour is detected (copying, cheating in any way, using unlicensed electronic devices, and others), it will be considered that the student does not gather the necessary requirements to pass the subject. In case of some unethical behaviour the mark will be 0.0 (FAILED) The COVID19 University policies can modify the final exam type, if we have to move to a "virtual exam". Any change will be announced properly so the students can adapt their learning processes to the new situation

Sources of information

Basic Bibliography

Complementary Bibliography

B. Novo, **Class notes**,

Any ac machines book,

Recommendations

Subjects that are recommended to be taken simultaneously

Automation and control fundamentals/V12G363V01304

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G363V01102

Physics: Physics 2/V12G363V01202

Basics of circuit analysis and electrical machines/V12G363V01302

Applied electrotechnics/V12G363V01501

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

- * Teaching methodologies maintained
- * Teaching methodologies modified
- * Non-attendance mechanisms for student attention (tutoring)
- * Modifications (if applicable) of the contents
- * Additional bibliography to facilitate self-learning
- * Other modifications

=== ADAPTATION OF THE TESTS ===

- * Tests already carried out
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...
- * Pending tests that are maintained
Test XX: [Previous Weight 00%] [Proposed Weight 00%]
...
- * Tests that are modified
[Previous test] => [New test]
- * New tests

