# Course Outline (Higher Education)

**School:** School of Science, Engineering and Information Technology

**Course Title:** ELECTROMECHANICAL ENERGY CONVERSION

**Course ID:** ENGIN2104

**Credit Points:** 15.00

**Prerequisite(s):** ENGIN1002 (Engineering Physics)

**Co-requisite(s):** Nil

**Exclusion(s):** Nil

**ASCED:** 031301

**Description of the Course :**

Electromechanical energy conversion theory is the cornerstone for the analysis of electromechanical motion devices.This course provides a broad overview of conversion devices and techniques. The course introduces concepts of machinery fundamentals and principles, transformers and AC / DC motors and generators.

**Grade Scheme:** Graded (HD, D, C, etc.)

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks..

**Program Level:**

| AQF Level of Program | | | | | | |
|---|---|---|---|---|---|---|
| | **5** | **6** | **7** | **8** | **9** | **10** |
| **Level** | | | | | | |
| Introductory | | | | | | |
| Intermediate | | | ✔ | | | |
| Advanced | | | | | | |

**Learning Outcomes:**

**Knowledge:**

**K1.** Explain and distinguish between energy conversion and electric machinery principles in describing operations and characteristics of transformers, motors and generators.

**K2.** Describe operations, principles and applications of single phase and special purpose motors.

**K3.** Differentiate between different machinery and their applicability to execute a specific task.

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**Skills:**

**S1.** Calculate machine power and performance parameters.

**S2.** Draw circuit equivalence and perform energy conversion calculations for transformers, motors and generators.

**S3.** Design and select suitable element for machine control.

**Application of knowledge and skills:**

**A1.** Analyse the energy conversion process within electric machines using the basic principles of electromechanical energy conversion.

**A2.** Determine a suitable electric machinery for a particular engineering system to operate under specific conditions.

**A3.** Apply software tools to simulate and study different electric machinery principles.

**Course Content:**

Topics may include:

- Machinery principles
- AC circuits and power concepts
- Three phase circuits & singly and doubly excited systems
- Transformers
- AC and DC machinery fundamentals
- Synchronous motors and generators
- DC motors and generators
- Single phase and special purpose motors

**Values:**

**V1.** Appreciate and apply safe practices in an environment that may contain potential electrical hazards.

**V2.** Appreciate the properties of magnetic materials and their application in electromechanical energy conversion systems.

**Graduate Attributes:**

FedUni graduate attributes statement. To have graduates with knowledge, skills and competence that enable them to stand out as critical, creative and enquiring learners who are capable, flexible and work ready, and responsible, ethical and engaged citizens.

| Attribute | Brief Description | Focus |
|---|---|---|
| Knowledge, skills and competence | Engineering is a fast-changing technological area, which affects our every-day life. Students will demonstrate the development of the knowledge, skills and competence needed to be a successful engineer. | High |
| Critical, creative and enquiring learners | Demonstration of the skills needed to be an independent, critical, and creative leaner is an essential feature of engineering education. Within their studies, students will demonstrate a basic ability to be creative and critical. | High |

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| Attribute | Brief Description | Focus |
|---|---|---|
| Capable, flexible and work ready | Engineering is inherently interdisciplinary in nature. It requires a teamwork approach to execute tasks to achieve common objectives. Training for this engagement is built in to second year through a demonstration of the basic skills needed within the engineering workplace. | Low |
| Responsible, ethical and engaged citizens | Through the breadth of learning the second year of the engineering programmes delivers, a student will develop an understanding of the engineering input needed for the advancement of humanity. | Low |

**Learning Task and Assessment:**

| Learning Outcomes Assessed | Learning Tasks | Assessment Type | Weighting |
|---|---|---|---|
| K1 - K3, S1 - S3, A1 - A3 | Experimental work and / or projects to verify students ability to apply knowledge and skills acquired in the course. | Reports, demonstrations | 10% - 30% |
| K1 - K3, S1 - S3, A1 - A3 | Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the course. | Assignments, quizzes | 10% - 30% |
| K1 - K3, S1 - S3, A1 - A3 | Questions and problems related to the materials covered in the course. | Mid and / or End of semester examination | 50% - 70% |

**Adopted Reference Style:**

Other (IEEE)