

**Environmental and Recycling Technology (M.Eng.), Computer Engineering for IoT Systems (M.Eng.), Renewable Energy Systems (M.Eng.)**

<b>Module – No.</b>	<b>870</b>	<b>Mandatory module</b>	
<b>Module name</b>	<b>Basics Electrical Engineering</b>		
Module coordinator	Prof. Dr.-Ing. Viktor Wesselak		
Title	<b>Basics Electrical Engineering</b>		
Title of examination	<b>Basics Electrical Engineering</b>		
Semester	Qualification		
Course type	Language	Lectures / Tutorial / Laboratory	English
SWS/ ECTS/ Workload	2 / 1 / 1	5	150
Requirements for attendance	none		

**1. Content and objectives**

**Content:**

**Part I DC Systems**

1. Resistances and Temperatures
2. Serial and parallel connections
3. Voltage & Current Divider
4. Kirchhoff's Laws
5. Mesh Flow Analyses

**Part II Single Phase Systems**

1. Complex Numbers
2. Complex Operators
3. Simple circuits driven by sinusoidal voltage
4. Real, Reactive and Apparent Power
5. Power Factor and compensation

**Part III Three Phase Systems**

1. Introduction multiphase systems
2. Star and Delta connection
3. Basics Generators
4. Basics Transformers

**Learning goals:**

The students will get a basic introduction of Electrical Engineering. Part I contains the knowledge to analyze easy circuits, feed by direct voltage. Resistances as a function of the temperature and serial and parallel connections will be treated. Finally Kirchhoff's Laws will be introduced. All contents of part I also can be applied for Part II & III. Complex numbers will be used to deal with sinusoidal functions as a basic procedure.

Part II will be focused to the basic calculation of simple circuits, driven by DC voltage. The meaning of the Power Factor and the apparent power will be clarified.

Part III will be more practical orientated. The students will deal with the multiphase systems and the possibility

to connect the systems into Star- or Delta-Connection.

Generators and Transformers will be introduced with their practical applications. Complicate calculations etc. will be avoided.

## 2. Method(s) of instruction

The module consists of an online lecture with the introduction of the subject matter and an integrated exercises. A separate exercise will add more sample tasks.

## 3. Requirements for attendance

There are no formal requirements for participation. Basics in physics, mathematics and mechanics are recommended. Basic knowledge in thermodynamics, heat transfer and renewable energies is useful.

Literature:

[1] Lecture Scripts will be uploaded

[2] sample task will be uploaded

## 4. Usability of this module

Basics Electrical Engineering is offered as mandatory module in the Master Study Courses: "Environmental and Recycling Technology" (M.Eng.), "Computer Engineering for IoT Systems" (M.Eng.), "Renewable Energy Systems" (M.Eng.)

## 5. Requirements for assessment

Assessment is performed as written examination (90 minutes). Other permissible forms of examination (online, oral, homework, etc.) are possible if they are announced by the person responsible for the module at the beginning of the semester.

## 6. ECTS credits

The grade of the module M870 corresponds to the grade of the exam. With the grading, 5 credit points (ECTS) are awarded.

## 7. Frequency of offer

The module is lectured annually in the winter (qualification) semester

## 8. Workload

The total workload for this module is 150 hours; this corresponds to 5 ECTS credits. This workload results from the presence at the lectures with an active participation of the students in the (virtual) laboratory (about 45 hours). As part of the self-study, the lecture material should be reworked (about 55 hours). The preparation and execution of the examination is about 50 hours.

## 9. Duration of module

The module is lectured in one semester.