# course syllabus and course requirements academic year 2022/2023 semester 1

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| Course title | Electrical Power Engineering 1 |
| **Course Code** | **IVB459ANVM** |
| **Hours/Week: le/pr/lab** | **2-1-0** |
| **Credits** | **4** |
| **Degree Programme** | **Basic Program of Electrical Engineering (BSc/K)** |
| **Study Mode** | **Full time training** |
| **Requirements** | **Exam** |
| **Teaching Period** | **3 (Autumn)** |
| **Prerequisites** | - |
| **Department(s)**  **Course Director** | **Department of Electric Networks**  **György Elmer PhD** |
| **Teaching Staff** | **György Elmer PhD** |
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# course description

*A short description of the course (max. 10 sentences).*

*Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description*

Students learn the nonrenewable and renewable primary and secondary energy sources, types and structures of power plants, electric networks and consumers, structure and characteristics of the electric energy system, power and data conductors and cables, methods of dimensioning conductors, over-current protection devices and their dimensioning, fundamentals of the electric safety, dimensioning the protection against electric shock.

# syllabus

*Neptun: Instruction/Subjects/Subject Details/Syllabus*

## **goals and objectives**

*Goals, student learning outcome.*

*Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction*

Main aim of this course is to make the students familiar with the energy sources, power plants, electric networks and consumers, power and data conductors and cables, with the dimensioning of conductors, over-current protection devices, the fundamentals of the electric safety.

## **course content**

*Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content*

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|  | TOPICS |
| LECTURE | 1. Overview of the nonrenewable and renewable primary and secondary energy sources, types and structures of power plants, electrical networks and types of electricity consumers*.* 2. Types, structure and marking of power and data cables. 3. Dimensioning of indoor electrical cables and cable systems. 4. Overcurrent protection. Structure and characteristics of fuses and automatic fuses. Dimensioning and selecting short circuit protection devices. 5. Fundamentals of the protection against electric shock. Dimensioning fault protection with the automatic disconnection of the faulty circuit. Working principle of the residual current device. |
| PRACTICE | 1. Solving problems on dimensioning of indoor electrical cables and cable systems according to voltage drop and thermal load. 2. Solving problems on dimensioning supply cables and distribution cables. Current torque, center of load, equivalent load. 3. Solving problems on dimensioning star-like distribution cables. Calculation of the equivalent cable length. 4. Solving problems on dimensioning cables fed at their both ends in case of identical and different supply voltages. |
| laboratory practice | - |

### **DETAILED SYLLABUS AND COURSE SCHEDULE**

### *academic holidays included*

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| LECTURE | | | | |
| week | **Topic** | **Compulsory reading; page number**  **(from … to …)** | **Required tasks (assignments, tests, etc.)** | **Completion date, due date** |
| 1. | Overview of the nonrenewable and renewable primary and secondary energy sources. | ELPE\_I\_01\_Energy Sources – p.1-13; | Test 1 | Week 8/15 |
| 2. | Overview of the types and structures of power plants. | ELPE\_I\_02\_Power  Plants – p.14-27 | Test 1 | Week 8/15 |
| 3. | The electric energy system. Structure of electrical networks. Arts of electricity consumers and their requirements. | ELPE\_I\_03\_Electr  Networks – p.28-45;  ELPE\_I\_04\_Consumers – p.46-54 | Test 1 | Week 8/15 |
| 4. | Types and structure of power and data cables. | ELPE\_I\_05\_Cables  p.55-70 | Test 1 | Week 8/15 |
| 5. | Dimensioning cables of indoor low voltage networks. Dimensioning for voltage drop and thermal load. | ELPE\_I\_05\_Cables  p.70-90 | Test 1 | Week 8/15 |
| 6. | Dimensioning supply cables and distribution cables. Current torque, center of load, equivalent load. | ELPE\_I\_05\_Cables  p.91-93 | Test 1 | Week 8/15 |
| 7. | Dimensioning star-like distribution cables. Calculation of the equivalent cable length. | ELPE\_I\_05\_Cables  p.93-95 | Test 1 | Week 8/15 |
| 8. | Test 1 | ELPE\_I\_\*  p.1-99 |  | Week 8 |
| 9. | Dimensioning cables fed at their both ends in case of identical and different supply voltages. | ELPE\_I\_05\_Cables  p.95-99 | Test 2 | Week 14/15 |
| 10. | Overcurrent protection. Structure and characteristics of fuses and automatic fuses. | ELPE\_I\_06\_OvercurrentProt  p.100-115 | Test 2 | Week 14/15 |
| 11. | Basic and fault protection of electric circuits and equipment. Fundamentals of the protection against electric shock. | ELPE\_I\_07\_Electr  Safety  p.116-132 | Test 2 | Week 14/15 |
| 12. | Dimensioning fault protection with the automatic disconnection of the faulty circuit. | ELPE\_I\_07\_Electr  Safety  p.146-163 | Test 2 | Week 14/15 |
| 13. | Working principle of the residual current device. | ELPE\_I\_07\_Overvolt  Prot | Test 2 | Week 14/15 |
| 14. | Test 2 | ELPE\_I\_\*  p.100-163 | Test 2 | Week 14 |
| 15. | Summary and semester closure. | ELPE\_I\_\*  p.1-163 | Test Retake | Week 15 |

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| PRACTICE, LABORATORY PRACTICE | | | | |
| week | **Topic** | **Compulsory reading; page number**  **(from … to …)** | **Required tasks (assignments, tests, etc.)** | **Completion date, due date** |
| 1. | Calculating single and three-phase systems. Calculating currents and powers. | ELPE\_I\_00\_Calc  Overview | Test 1 | Week 8/15 |
| 2. | Calculation problems on supply cables of direct and alternating current single-phase circuits. | ELPE\_I\_00\_Calc  Overview ELPE\_I\_P01\_ELV | Test 1 | Week 8/15 |
| 3. | Calculation problems on supply cables of direct and alternating current single-phase circuits. | ELPE\_I\_P02\_LV1P,  ELPE\_I\_P02\_LV3P | Test 1 | Week 8/15 |
| 4. | Calculation problems on distribution cables. | ELPE\_I\_P10\_Distrib | Test 1 | Week 8/15 |
| 5. | Calculation problems on star-like distribution cables. | ELPE\_I\_P11\_Star | Test 1 | Week 8/15 |
| 6. | Calculation problems on star-like distribution cables. | ELPE\_I\_P12\_Star,  ELPE\_I\_P13\_Star | Test 1 | Week 8/15 |
| 7. | Calculation problems on cables fed at their both ends with identical supply voltages. | ELPE\_I\_P20\_Ident | Test 1 | Week 8/15 |
| 8. | Test 1 | ELPE\_I\_P10 – 13 |  | Week 8 |
| 9. | Calculation problems on cables fed at their both ends with identical supply voltages. | ELPE\_I\_P21\_Ident | Test 2 | Week 14/15 |
| 10. | Calculation problems on cables fed at their both ends with different supply voltages. | ELPE\_I\_P25\_Diff,  ELPE\_I\_P26\_Diff | Test 2 | Week 14/15 |
| 11. | Calculation problems on cables fed at their both ends with different supply voltages. | ELPE\_I\_P27\_Diff,  ELPE\_I\_P28\_Diff | Test 2 | Week 14/15 |
| 12. | Calculation problems on rating cables and fault protection devices of circuits. | ELPE\_I\_P30\_ScProt | Test 2 | Week 14/15 |
| 13. | Calculation problems on rating cables and fault protection devices of circuits. | ELPE\_I\_P31\_ScProt | Test 2 | Week 14/15 |
| 14. | Test 2 | ELPE\_I\_P20 -31 |  | Week 14 |
| 15. | Summary and semester closure. | ELPE\_I\_\* | Test Retake | Week 15 |

## **assessment and evaluation**

*(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)*

##### **Attendance**

*In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.*

***Method for monitoring attendance*** *(e.g.: attendance sheet / online test/ register, etc.)*

Attendance sheet.

##### **assessment**

*Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.*

Course-unit with final examination

**Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam**

(The samples in the table to be deleted.)

|  |  |  |
| --- | --- | --- |
| Type | Assessment | Weighting as a proportion of the pre-requisite for taking the exam |
| 1. *e.g..: Test 1* | *max 100 points* | *25 %* |
| 1. *e.g.: Test 2* | *max 100 points* | *25 %* |
| 1. *e.g.: home assignment (project documentation)* | *max 200 points* | *50 %* |

**Requirements for the end-of-semester signature**

(Eg.: mid-term assessment of 40%)

Mid-term assessment of 40%

**Re-takes for the end-of-semester signature** (PTE TVSz 50§(2))

*The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.*

15th week for the tests.

***Type of examination*** *(written, oral): written*

***The exam is successful if the result is minimum 40 %.*** *(The minimum cannot exceed 40%.)*

**Calculation of the grade** (TVSz 47§ (3))

The mid-term performance accounts for  ***50***  %, the performance at the exam accounts for  ***50***  % in the calculation of the final grade.

**Calculation of the final grade based on aggregate performance in percentage.**

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| --- | --- |
| **Course grade** | **Performance in %** |
| excellent (5) | 85 % … |
| good (4) | 70 % ... 85 % |
| satisfactory (3) | 55 % ... 70 % |
| pass (2) | 40 % ... 55 % |
| fail (1) | below 40 % |

The lower limit given at each grade belongs to that grade.

## **Specified literature**

*In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)*

##### **compulsory reading and availability**

[1.] ELPEa\_I\_\* electronic textbook written by György ELMER PhD. Available from the lecturer onto an own pendrive of the student.

[2.] -

##### **recommended literature and availability**

[3.] -