University of Žilina

Faculty of Electrical Engineering and Information Technology

GUIDE TO DOCTORAL DEGREE STUDY

STUDY PROGRAMME:	THEORY OF ELECTRICAL ENGINEERING
FIELD OF STUDY:	ELECTRICAL ENGINEERING
CHAIRPERSON OF THE WORKING GROUP:	PROF. ING. LADISLAV JANOUŠEK, PHD.
GUARANTOR OF THE STUDY PROGRAMME:	PROF. ING. LADISLAV JANOUŠEK, PHD.

ŽILINA, 2022

1. DETAILS ON THE STUDY PROGRAMME

1.1 Characteristics of the Study Programme

Name of the study programme:	Theory of Electrical Engineering
Name of the field of study:	Electrical Engineering
Degree of higher education:	Third (doctoral degree study programme)
Form of study:	full-time/part-time

Requirements for Applicants for Study: The basic condition for admission to the doctoral degree study (study programme of the third degree) is the full completion of the second degree of higher education in the cybernetics, electrical engineering, or computer science fields of study. Other conditions of admission are stated in the document Principles and rules of the admission procedure for studying at the Faculty of Electrical Engineering and Information Technology (available at: https://feit.uniza.sk/en/doctoral-studies/)

1.1.1 Graduate Profile

The graduate represents a qualified expert educated in the field of theory of electrical engineering with significant overlap in the multidisciplinary field of biomedical engineering. The graduate is ready to present the results achieved within the studied program in front of a wide professional public at professional scientific symposia, conferences, and workshops. The graduate can interpret the results of scientific research activities not only in his native language, but also in the chosen world language. In addition to the presentation of the achieved results, he is also able to appropriately confront them with the expert audience.

By applying the acquired knowledge, he can analyse and evaluate the investigated problems, while the common denominator of his work is creativity and creation at the highest cognitive level. He perceives the results of his solving tasks and connected problems as a challenge. He can evaluate the results of his work as well as other professional works using a valid, dependable, and transparent approach. In the process of confronting the results and at the same time in the pedagogical process, in relation to students of lower degrees of study, he uses constructive feedback. From the point of view of acceptance of his performance, he places maximum emphasis on the accuracy and quality of his outputs.

He can solve complex problems in the subject area with an independent active approach to the solved problem. To achieve goals, he knows how to eruditely use the potential of computing technology and available literature resources. He connects analytical and synthetic ways of thinking and implementation of these approaches to the solved task, while being able to take a written position on the investigated problem in the form of quality professional publications, works and presentations of his activities. In the field of theory of electrical engineering with significant overlap into the multidisciplinary field of biomedical engineering, he is an experienced and sought-after expert in the fields of sensorics and non-invasive diagnostics based on electromagnetic principles and in the field of electromagnetic biocompatibility, and its applicability on the labour market is easy.

1.1.2 Parts of the Doctoral Degree Study

The study of a doctoral degree study programme (hereinafter referred to as "doctoral degree study") is governed by the provisions stipulated in the Directive No. 110 – Study Regulations for the Third Degree of the University Study at the University of Žilina *https://uniza.sk/images/pdf/kvalita/EN/smernica-UNIZA-c-110-en.pdf* and the Directive No. 216 – Quality Assurance of the Doctoral Degree Studies at the University of Žilina *https://uniza.sk/images/pdf/kvalita/EN/smernica-UNIZA-c-216-en.pdf* and/or the Directive No. 198 – Support for Applicants for Study and Students with Specific Needs at the University of Žilina Smernicou

č. 198 *Podpora uchádzačov o štúdium a študentov so špecifickými potrebami na Žilinskej univerzite v Žiline*.) The doctoral degree study at the Faculty of Electrical Engineering and Information Technology is monitored by a working group of the field committee (WG FC) established for a given study programme (see Chapter 2 for more details).

The doctoral degree study is conducted according to an individual study plan under the guidance of a supervisor, while the set of knowledge, skills, and abilities is adapted to the specific topic of the dissertation. The basis for the set of knowledge comprises the following disciplines: Basics of Research Practice, Foreign language, Selected Chapters from Mathematics, Analysis and Processing of Signals in BME, Applied Electromagnetism, Electromagnetic Methods of Non-Destructive Material Evaluation, Electromagnetic Field and Biological Systems, Electromagnetic Waves Propagation in Bounded and Unbounded Media, Special Electromagnetic Measuring Methods in BME, Theory of Electromagnetic Circuits, Theory of Electromagnetic Field, Wave Processes in Materials.

The individual study plan (hereinafter referred to as **ISP**) is elaborated by the supervisor in cooperation with a PhD. student according to the needs of the selected dissertation in accordance with the assurance of the required quality of scientific work and education of PhD. students. Subsequently, it is submitted for approval to the members of the WG FC through its chairperson and to the guarantor of the relevant study programme (hereinafter referred to as SP). WG FC is established according to the internal regulations of the faculty. After its approval, the dean of the faculty finally comments on it.

As part of the evaluation of the study, credits are allocated to a PhD. student for individual activities. A prerequisite for the successful completion of the doctoral degree study is that the PhD. student has obtained at least 180 credits during the doctoral degree study. The doctoral degree study consists of a study, a scientific and a pedagogical part.

The study part represents at least 50 credits of the ISP. It consists of the study of two compulsory courses, two compulsory elective courses, and the compulsory course 'Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination'. The compulsory courses are 'Basics of Research Practice' and 'Foreign Language'. Selection of the two compulsory elective courses depends on a topic of a dissertation thesis and it is specified in the ISP of a PhD. student. All courses of the study part are the state examination courses. A more detailed description is given in the section 1.2.

The scientific part represents at least 130 credits of the ISP. It is conducted by means of dissertation projects I to IV, individual and team scientific work, including the elaboration and the defence of the dissertation thesis. Dissertation projects I, II, III, and IV represent consequential parts (stages) of the dissertation thesis. The allocation of credits for individual and team scientific work is determined by Table 1, while the number of credits for published scientific papers shall be determined according to the percentage share of the PhD. student in the publication output.

As a rule, an integral part of the activities of a PhD. student in the full-time form of study, prescribed in the ISP, is the active participation of the PhD. student in a foreign study stay at a partner workplace of the PhD. student's training institute. It is recommended to include in the PhD. student's ISP the completion of a foreign study stays lasting at least two months or one semester (Directive No. 110 – *Study Regulations for the Third Degree of the University Study at the University of Žilina*). For this foreign study stay, the PhD. student is awarded additional credits as stated in Table 3.

A condition for the proper completion of the doctoral degree study is the passing of the Dissertation examination, which is the state examination, and the dissertation thesis' defence. The dissertation thesis represents a final thesis. After the dissertation thesis has been elaborated, accepted, and defended, the PhD. student will receive 30 credits (the course 'The Thesis and Dissertation Defence ').

The pedagogical part is the teaching activity stipulated in the ISP in the full-time form of study for a maximum of 4 hours per week on average per academic year; in the part-time form of study, there is the obligation to provide selected professional lectures and to perform other professional activities.

Table 1 Allocation of credits for individual and team scientific work

Assessment of the individual and team scientific work	**Credits**
Dissertation projects (they form consequential parts of the dissertation thesis) – **compulsory**	
Dissertation project I Dissertation project II Dissertation project III Dissertation project IV	10 10 10 10
Published scientific papers	
Papers registered in the WoS database** - paper in an impacted journal with quartile Q1 - paper in an impacted journal with quartile Q2 - paper in an impacted journal with quartile Q3 - paper in an impacted journal with quartile Q4 - conference papers and proceedings (collections)	 80* 60* 40* 20* 20*
Papers registered in the SCOPUS database*** - paper in an impacted journal with quartile Q1 - paper in an impacted journal with quartile Q2 - paper in an impacted journal with quartile Q3 - paper in an impacted journal with quartile Q4 - conference papers and proceedings (collections)	 40* 30* 20* 10* 10*
Other papers in journals or conference proceedings in a world language / the Slovak language	8/4*
Paper (chapter) in a monograph, university textbook in a world language / other language	20/10*
Protected outputs related to the dissertation - patent - utility model	 60* 30*
Responses	
citation registered in the SCI citation index	2
Active presentation of results	
- at one international conference abroad or at home in a world language**** - at other conferences	10 5

* the number of credits shall be determined by the percentage share of the PhD. student in the publication output.
** http://www.isiknowledge.com/WOS
*** http://www.scopus.com/home.url
**** also in case of presenting more than one paper

Credits are awarded only for publications related to the topic of the dissertation, elaborated in collaboration with the supervisor. They are listed in the annual evaluation of a PhD. student.

1.1.3 Rules and Conditions for the Elaboration of the Individual Study Plans

The basic rules and conditions for the elaboration of ISP are defined in the provisions stipulated in the Directive No. 110 – *Study Regulations for the Third Degree of the University Study at the University of Žilina* and the Directive No. 216 – *Quality Assurance of the Doctoral Degree Studies at the University of Žilina*.

The ISP of the PhD. student contains a list of courses to be completed by a PhD. student, a list of courses for the Dissertation examination selected from the list approved by the WG FC, and a list of required and recommended literature to be studied by a PhD. student as part of his/her individual preparation for the Dissertation examination. The ISP of a PhD. student also includes the deadlines for the completion of the individual courses and the Dissertation exam. An integral part of the activities of a PhD. student prescribed in the ISP is the active participation of a PhD. student at international conferences, especially those indexed in the international databases (WoS, SCOPUS), and publication in scientific journals, while at least one paper is published in an impacted journal. It is recommended to include the obligation to publish at least one paper in an impacted journal that has been assigned a quartile of at least Q3 in the Web of Science or at least Q2 in the SCOPUS database in the ISP of a PhD. student. It is recommended to include the completion of a foreign study stay in the ISP of a PhD. student.

The ISP is elaborated by a supervisor in collaboration with a PhD. student according to the needs of the selected dissertation thesis in accordance with the quality assurance of the scientific work and education of PhD. students on a prescribed up-to-date form of the Faculty of Electrical Engineering and Information Technology (https://feit.uniza.sk/en/doctoral-studies/)

The standard length of **full-time** study: **3 years**
The standard length of **part-time** study: **4 years**

The division of the study into parts and the conditions for advancement to the next year of study are expressed in terms of the number of credits obtained.

A supervisor continuously assesses the quality and the level of the fulfilment of the ISP of a PhD. student as well as compliance with deadlines, and he/she proposes the allocation of credits for individual and team scientific work.
A supervisor shall elaborate annual evaluation of a PhD. student's fulfilment of the ISP (**Annual Evaluation of a PhD. student**) by August 31 of the corresponding academic year, including a statement as to whether or not he/she recommends the continuation of the doctoral degree study. In doing so, a supervisor shall assess the status and level of fulfilment of the ISP of a PhD. student, compliance with deadlines, award credits, and, if necessary, submit a proposal for modification of the ISP of a PhD. student. The annual evaluation of a PhD. student is approved by a guarantee of a relevant study programme and subsequently by a dean. Based on the annual evaluation of a PhD. student, a dean decides whether a PhD. student may continue his/her study and on any changes to his/her study programme.

1.2 Organisation of the Study - Full-time Study

The basic part of the study is a year of study, which begins on September 1 and ends on August 31 of the relevant academic year. The full-time study is divided into years as follows:
The first year - a student shall obtain a minimum of 40 credits,
The second year - a student shall obtain a minimum of 60 credits or a total of at least 100 credits for the first and the second year.
The third year - a student shall obtain enough credits to achieve a minimum of 180 credits for the entire course of study.

The condition for advancement to the next year of the study is the acquisition of the prescribed number of credits in a given academic year. Failure to meet this requirement will result in the withdrawal a student from the study. The individual study plan is designed in such a way that by completing it the student will meet the conditions for the proper study completion (graduation) within the standard length of study.

Other conditions for the proper completion of the study:

- successful completion of compulsory and compulsory elective courses of the study programme in accordance with the rules and conditions for the design of the ISP,
- publication of the results obtained during the study, which are related to the topic of the dissertation thesis. The minimum requirement is the publication of at least one scientific paper in a foreign impacted scientific journal, in a world language, which has been assigned a quartile of at least Q3 in the Web of Science or at least Q2 in the SCOPUS database, while a PhD. student as an author or a co-author should have at least 25% share in the respective publication (at the time of the dissertation thesis defence, the PhD. student must submit a published article or a confirmation of its acceptance),
- passing the state examinations (in accordance with the study regulations), which are:
  - dissertation examination – in the full-time form of study, a PhD. student shall apply for the dissertation examination no later than 18 months from the date of enrolment in the study. It is recommended to take the dissertation examination within 12 months from the date of enrolment. The dissertation examination consists of a part consisting of a debate on the written work for the dissertation examination and a part in which a PhD. student shall demonstrate his/her theoretical knowledge in the specified courses of the examination dissertation. A PhD. student may also take examinations from individual courses during the study part of the doctoral degree study before the debate on the written work for the dissertation examination,
  - successful dissertation thesis defence.

As a rule, active participation of a PhD. student in a foreign study stay at a partner workplace of a PhD. student's training institute of at least two months (cumulatively) is an integral part of the study. In the case of objective reasons, it is possible to establish, in agreement with a dean of the faculty, an alternative fulfilment of the above requirement based on a justified request of a supervisor.

Table 2a Recommended ISP – full-time study

Type of the course (selectiveness)	**Course name**	**Credits**	**The extent of teaching activities**	**Completion**
The first year				
Cmp	Basics of Research Practice	10	2-0-0	SE
CmpE	Compulsory elective course I	10	0-2-0	SE
CmpE	Compulsory elective course II	10	0-2-0	SE
Cmp	Foreign Language	10	2-0-0	SE
	Pedagogical Activity	-	0-0-4	-
	Individual and Team Scientific Work	*		C
The second year				
Cmp	Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination	10		SE
	Individual and Team Scientific Work	*		C
	Pedagogical Activity	-	0-0-4	-
	Dissertation project I	10		C
The third year				
	Individual and Team Scientific Work	*		C
	Pedagogical Activity	-	0-0-4	-
	Dissertation project II**	10		C
	Dissertation project III**	10		C
	Dissertation project IV	10		C

Cmp	The Thesis and Dissertation Defence	30		SE

* The number of awarded credits is stated in Table 1.

** The student can also take the course during the second year of the doctoral degree study

Notes:

- SE - state examination, C - credits, Cmp – compulsory subject, CmpE – compulsory elective subject
- In any semester a PhD. student may additionally enrol for another compulsory elective course (CmpE)
- The table indicates the weekly range of obligations.

1.3 Organisation of the Study - Part-time Study

The basic part of the study is a year of study, which begins on September 1 and ends on August 31 of the relevant academic year. A part-time student completes his/her study obligations similar to a full-time student, with the exception of a foreign study stay.

In an individual study plan, the study obligations are spread over 4 years of study, provided that the following conditions are met:

The first year - a student shall obtain a minimum of 30 credits,
The second year - a student shall obtain enough credits to achieve a total of at least 90 credits for the first and the second year,
The first year - a student shall obtain a minimum of 45 credits,
The fourth year - a student shall obtain enough credits to achieve a minimum of 180 credits for the entire course of study.

Other conditions for the proper completion of the study are similar to those for the full-time form of study:

- successful completion of compulsory and compulsory elective courses of the study programme in accordance with the rules and conditions for the design of the ISP,
- publication of the results obtained during the study, which are related to the topic of the dissertation thesis. The minimum requirement is the publication of at least one scientific paper in a foreign impacted scientific journal, in a world language, which has been assigned a quartile of at least Q3 in the Web of Science or at least Q2 in the SCOPUS database, while a PhD. student as an author or a co-author should have at least 25% share in the respective publication (at the time of the dissertation thesis defence, the PhD. student must submit a published article or a confirmation of its acceptance),
- passing the state examinations (in accordance with the study regulations), which are:
  - dissertation examination – in the part-time form of study, a PhD. student shall apply for the dissertation examination no later than 36 months from the date of enrolment in the study, it is recommended to do so no later than 24 months. The dissertation examination consists of a part consisting of a debate on the written work for the dissertation examination and a part in which a PhD. student shall demonstrate his/her theoretical knowledge in the specified courses of the dissertation examination. A PhD. student may also take examinations from individual courses during the study part of the doctoral degree study before the debate on the written work for the dissertation examination,
  - successful dissertation thesis defence.

The pedagogical activity may be replaced by the delivery of selected professional lectures and the performance of other professional activities.

Table 2b Recommended ISP – part-time study

Type of the course (selectiveness)	Course name	Credits	The extent of teaching activities	Completion

The first year

Cmp	Basics of Research Practice	10	2-0-0	SE
CmpE	Compulsory elective course I	10	2-0-0	FSE
Cmp	Foreign Language	10	2-0-0	SE
	Individual and Team Scientific Work	*		C

The second year

CmpE	Compulsory elective course II	10	2-0-0	SE
Cmp	Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination	10		SE
	Individual and Team Scientific Work	*		C

The third year

	Individual and Team Scientific Work	*		C
	Dissertation project I	10		C
	Dissertation project II	10		C

The fourth year

	Individual and Team Scientific Work	*		C
	Dissertation project III	10		C
	Dissertation project IV	10		C
Cmp	The Thesis and Dissertation Defence	30		SE

* The number of awarded credits is stated in Table 1.
Note: See also the notes regarding the study plan for the full-time study.

1.4 List of Compulsory and Compulsory Elective Courses

Compulsory courses

Type of the course (selectiveness)	Course name	Credits	The extent of teaching activities	Completion
Cmp	Basics of Research Practice	10	2-0-0	SE
Cmp	Foreign Language	10	2-0-0	SE
Cmp	Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination	10		SE
Cmp	The Thesis and Dissertation Defence	30		SE

Compulsory elective courses

Type of the course (selectiveness)	Course name	Credits	The extent of teaching activities	Completion
CmpE	Selected Chapters from Mathematics	10	2-0-0	SE
CmpE	Analysis and Processing of Signals in BME	10	0-2-0	SE

CmpE	Applied Electromagnetism	10	0-2-0	SE
CmpE	Electromagnetic Methods of Non-Destructive Material Evaluation	10	0-2-0	SE
CmpE	Electromagnetic Field and Biological Systems	10	0-2-0	SE
CmpE	Electromagnetic Waves Propagation in Bounded and Unbounded Media	10	0-2-0	SE
CmpE	Special Electromagnetic Measuring Methods in BME	10	0-2-0	SE
CmpE	Theory of Electromagnetic Circuits	10	0-2-0	SE
CmpE	Theory of Electromagnetic Field	10	0-2-0	SE
CmpE	Wave Processes in Materials	10	0-2-0	SE

1.5 Provision of the Individual Study Plan for a PhD. Student

The basic regulation for the provision of individual study plan for a doctoral student is the Directive No. 110 *Study Regulations for the Third Degree of University Study at the University of Žilina*.

PhD. students in the full-time form of doctoral study are bound by the decisions and regulations of a head of the department in cooperation with a supervisor and a head of the training institute where they are studying. They respect the established rules at their workplace. PhD. students in the full-time form of doctoral study take part in activities of their workplace, in line with their individual study plan (regarding its study, scientific as well as pedagogical aspects). Further obligations of PhD. students and the requirements of doctoral study are laid down in Articles 4 and 5 of this Directive.

Obligations of supervisors are governed by Article 6 of the Directive No. 110 *Study Regulations for the Third Degree of the University Study at the University of Žilina*.

1.5.1 Dissertation Examination

The details regarding the dissertation examination are listed in the Decision of the Dean of the Faculty of Electrical Engineering and Information Technology on the Organisation and Administrative Provision for the 3rd Degree of Study (https://feit.uniza.sk/en/doctoral-studies/).

1.5.2 Course Examinations

The examinations regarding the individual courses can be completed even during the study part of the doctoral study, before the dissertation examination, but only following the proposal of the supervisor and after the approval of a chairperson of the working group. A chairperson of the working group can give the approval for one PhD. student for several examinations, or for certain examinations of several PhD. students. In such cases, the examination shall be held in front of a committee, in the presence of a course teacher, a supervisor (in justified cases, a supervisor's delegate), and two other members, one of which is usually from an external environment outside the training institute. The completion of individual courses is evaluated by the grade. All examinations take place in accordance with the provisions found in the Directive No. 110 *Study Regulations for the Third Degree of University Study at the University of Žilina* and in the Decision of the Dean of the Faculty of Electrical Engineering and Information Technology on the Organisation and Administrative Provision for the 3rd Degree of Study in the given academic year.

"Basics of Research Practice" Course Examination

During the semester, a PhD. student attends selected lectures related to their scientific work, including the ethics of scientific work and the presentation of achieved results. A PhD. student continuously studies scientific articles related to the topic of the dissertation thesis and prepare a scientific paper in a world language suitable for publication at an international conference, or in a journal, as well as for the defence in front of professionals. The completed paper along with its presentation will be

evaluated by a committee during the oral examination. The examination consists of an oral dispute on the prepared paper by a PhD. student.

"Foreign Language" Course Examination

The examination follows the rules listed below:

- an examiner, in cooperation with a supervisor, determines the scope and range of study from a selected literature in a relevant world language; the recommended range is 100-150 pages;
- a PhD. student presents the acquired knowledges from the literature in a world language within 15 minutes,
- an examiner, appointed by a chairperson of the field committee working group, designates a short text from the prescribed literature to be read and translated by the PhD. student. An examiner shall ensure that the text is available to all members of an examination committee;
- this is followed by a free discussion regarding the topic of the exam, conducted in a relevant world language;
- for the final evaluation of the Foreign Language course, a committee also takes into account the percentage of success in the previous 2 semesters of language education.

Based on the previous approval of a supervisor and a chairperson of the field committee working group, the examination of the "Foreign Language" course can be conducted along with the "Basics of Research Practice" course examination. In this case, the study of scientific articles related to the preparation of the paper for publication represents the selected scientific literature in the relevant world language. An examiner, appointed by a chairperson of the field committee working group, determines the relevant text from the selected scientific literature, which a PhD. student reads and translates. The next part of the examination is the presentation of the paper and a discussion. Each subject is graded individually.

1.5.3 Allocation of Credits for Foreign Study Stay

Before travelling abroad for a study stay within an optional mobility programme, a PhD. student, in cooperation with a supervisor and the host institution, defines a timetable for the stay containing relevant tasks and expected outcomes. Credits will be allocated for the active foreign study stay in the scientific part of the doctoral study according to the duration of the stay.

According to the duration, a PhD. student can take part in a short-term stay – 30 days or fewer, or a long-term stay – 31 days and more.

Table 3 Allocation of Credits *for an Active Participation of a PhD. Student on a Short-term Foreign Study Stay*

Duration of a Foreign Short-term Scholarship of a PhD. Student	**Credits**
7 days or fewer	3
8 ÷ 14 days	6
15 ÷ 21 days	9
22 ÷ 30 days	12

Table 4 Allocation of Credits *for an Active Participation of a PhD. Student on a Long-term Foreign Study Stay*

Duration of a Foreign Long-term Scholarship of a PhD. Student	**Credits**

31 ÷ 60 days	15
61 ÷ 90 days	20
91 ÷ 120 days	25
121 days and more	30

1.1.5. Departmental Dissertation Thesis Defence

The departmental dissertation thesis defence takes place at the department – PhD. student's training workplace, no later than 2 weeks before the dissertation thesis submission date. The departmental dissertation thesis defence aims to critically assess the content of the dissertation thesis and to comprehensively acquaint the department with the results achieved during its completion. For the departmental defence, a PhD. student submits the dissertation in a prescribed form not yet bound. After the submission of the dissertation thesis, a supervisor shall nominate a departmental reviewer to a chairperson of the working group. A chairperson of the working group appoints the departmental reviewer and asks him/her to prepare an expert opinion. After consultation with a reviewer, the chairperson will determine the date of the departmental dissertation thesis defence.

This defence proceeds as follows:

a) a supervisor informs the department of his/her evaluation of a PhD. student;
b) a PhD. student presents his/her dissertation thesis;
c) a departmental reviewer presents his/her expert opinion and comments;
d) a PhD. student provides a detailed response to the reviewer's comments;
e) the defence concludes with mandatory recommendations that a PhD. student must fulfil before the final submission of the dissertation thesis.

1.1.6. Dissertation Thesis

The details regarding the dissertation thesis defence are listed in the Decision of the Dean of the Faculty of Electrical Engineering and Information Technology on the Organisation and Administrative Provision for the 3rd Degree of Study (https://feit.uniza.sk/en/doctoral-studies/).

2. WORKING GROUP OF THE FEIT UNIZA FIELD COMMITTEE

2.1. Introductory Provisions

a) A working group of a field committee (hereinafter referred to as WG FC) is a group established for doctoral study according to Part 5, Section 54, par. 17 of Act No. 131/2002 Coll. on Higher Education Institutions and on Amendments to Certain Acts, as amended (hereinafter referred to as the Act). For the accredited study programme Theory of Electrical Engineering of the study field Electrical Engineering (hereinafter referred to as the field) of the doctoral study for providing and awarding the academic title „Philosophiae doctor" (abbreviation PhD.), the working group Theory of Electrical Engineering of the field committee Electrical Engineering is established.
b) The establishment of the WG FC follows the Directive No. 110 *Study Regulations for the Third Degree of University Study at the University of Žilina* and the Directive No. 216 *Quality Assurance of the Doctoral Degree Studies at the University of Žilina*.

2.2. Rules of Procedure for the Field Committee Working Group

The field committee working group is appointed by a dean after the approval of the Faculty's Scientific Board. The composition of the WG FC follows the Directive No. 110 *Study Regulations for the Third Degree of the University Study at the University of Žilina*. At the first meeting, governed by a dean of the faculty, the members of the WG FC shall vote a chairperson of the WG FC.

Meetings of the WG FC are governed by the following principles:

- The meetings of WG FC take place usually twice a year; meeting of the WG FC is called by a chairperson, who simultaneously sets the agenda for the meeting of the WG FC. In special cases, the meeting of WG FC may be called by a dean of the Faculty of Electrical Engineering and Information Technology (FEEIT), UNIZA. If this happens, a dean also sets the agenda for the meeting.
- A dean of the Faculty of Electrical Engineering and Information Technology has the right to participate in the meetings of the WG FC, but does not have the right to vote if he/she is not member of the WG FC;
- a chairperson of the WG FC submits the copy of the minutes from the WG FC meeting to the Student Affairs Department for archiving; the meeting of the WG FC shall be governed by the set agenda; the WG FC has a quorum if at least 1/2 of its members are present; a vote shall be valid if the majority of present members vote in favour of a proposal;
- in exceptional cases, voting may be carried out by correspondence or by electronic means. A correspondence or electronic voting shall be valid provided that 2/3 of the WG FC members are present. For a valid vote, the approval of a majority of the voting members is required.

The list of WG FC members for the doctoral study: Theory of Electrical Engineering is available at the faculty's website: (https://feit.uniza.sk/en/doctoral-studies/).

3. FINAL PROVISIONS

Related mandatory documentation on the organisation of the doctoral study and activities of the field committee's working group:

Act No. 131/2002 Coll. *on Higher Education Institutions and on Amendments to Certain Acts, as amended*.

Directive No.110 *Study Regulations for the Third Degree of University Study at the University of Žilina.*

Directive No. 216 *Quality Assurance of the Doctoral Degree Studies*

Directive No.215 *On Final, Rigorous, and Habilitation Theses under the Conditions of the University of Žilina*

METHODOLOGICAL GUIDELINE No. 3/2022 to Directive No. 215 On Final, Rigorous and Habilitation Theses under the Conditions of the University of Žilina

Directive No.207 *UNIZA Code of Ethics*

Directive No. 226 *On Copyright Ethics and the Elimination of Plagiarism under the Conditions of the University of Žilina*

Methodological guideline 56/2011 of the Ministry of Education, Science, Research and Sport of the Slovak Republic.

Further information and forms regarding the doctoral study (available at FEIT website: https://feit.uniza.sk/en/doctoral-studies/):

• Decision of the dean on the organisation and administrative provision for the third degree of study in the given academic year;
• Study plan of a FEEIT PhD. Student;
• Examination protocol of a FEEIT PhD. Student;
• Annual evaluation of a FEIT PhD. Student;
• Lists of study programme guarantors, members of field committee's working group, supervisors, course information sheets and further instructions, current information, and directives.

APPENDICES

APPENDIX No. 1

Course information sheets

<table>
<tr><td colspan="2">University: University of Žilina</td></tr>
<tr><td colspan="2">Faculty: Faculty of Electrical Engineering and Information Technology</td></tr>
<tr><td>Course ID: 3D0E0E1</td><td>Course name: Basics of Research Practice (ZVP)</td></tr>
<tr><td colspan="2">Course selectiveness: Compulsory; Course ending: State exam</td></tr>
<tr><td colspan="2">Profile course: - Core course: -</td></tr>
<tr><td colspan="2">Form, extent and method of teaching activities:</td></tr>
<tr><td>Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice</td><td>Lectures: 2
Seminars: 0
Lab.exercises: 0</td></tr>
<tr><td>Methods by which the educational activity is delivered</td><td>Present form of education</td></tr>
<tr><td>Applied educational activities and methods suitable for achieving learning outcomes</td><td>Lectures: lectures implementing problem-solving methods, interactive lectures with discussion, lectures with multimedia support, discussion, consultancy with feedback.</td></tr>
<tr><td colspan="2">Number of credits: 10</td></tr>
<tr><td colspan="2">Study workload: 300 hours;
2h*13+0h*13+0h*13 (on-site education)
100h (project based learning – concept of the scientific paper for submission)
74h (consultancy on scientific paper preparation)
100h (self-study)</td></tr>
<tr><td colspan="2">Recommended semester/term of study: summer, 1. year</td></tr>
<tr><td colspan="2">Study degree: 3</td></tr>
<tr><td colspan="2">Required subsidiary courses:
Prerequisites:
-
Co-requisites:
-</td></tr>
<tr><td colspan="2">Course requirements:
Continuous assessment / evaluation:
Students deal with scientific papers covering the area of the dissertation thesis and prepare their own scientific paper for submission and for its defence in front of the scientific public and which will be included in the assessment by the scientific committee in the oral examination.
Final assessment /evaluation:
The examination consists of an oral dispute on the prepared paper.
The concrete way of assessment of the work in the semester and examination will be specified at the beginning of the semester by the teacher of the subject.
Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.</td></tr>
</table>

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
Scientific paper for submission	40	Professional knowledge, work with information, team work, presentation skills
portfolio	10	Professional knowledge, work with information, independent and team work
examination	50	Professional knowledge, presentation skills

Course outcomes:

Students understand and use publication databases, can obtain relevant information, publications, and resources for their further application within dissertation theses. Students can analyse information obtained by the study of scientific resources, they can evaluate and select important facts and evaluate relevant connections in terms of dissertation objectives.
Students will be able to formulate their own conclusions and hypotheses following the obtained knowledge. They will analyse data from research activities, namely independent research work, publication activities in the research team aimed at confirmation of the stated hypotheses and they form and present research reports.
Students can create their own papers for submission and defend them in front of the scientific public. Students can present the results of their own scientific and research activities and also activities of the research team.

Course scheme:
Sources to obtain relevant information for scientific activities. Support and structure of modern science. Scientific and non-scientific methods: types and characteristics. Methods of collection of scientific information. Methods of processing and evaluation of scientific information. Research process and its stages. Types of research and design of research project. Ethics of scientific work and output presentation.

Literature:
Kumar, R: Research methodology: A step-by-step guide for beginners, SAGE, 2014
Hulín I et al.: Úvod do vedeckého bádania. Slovak Academic Press Bratislava, 2003, 553s
Hanáček J, Javorka K a kol. Základy vedecko-výskumnej práce. Príručka pre doktorandov a mladých vedeckých pracovníkov. Osveta Martin, 1. vydanie, 2008

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Lecture: prof. Ing. Michal Frivaldský, PhD.
Lecture: prof. Ing. Ladislav Janoušek, PhD.
Lecture: prof. Ing. Dušan Pudiš, PhD.
Lecture: prof. Ing. Pavol Špánik, PhD.

Last updated: 2022-07-29 08:50:56.430

The person responsible for the course: prof. Ing. Pavol Špánik, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

Higher education institution: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0E012	**Course name:** Foreign Language (SvJ)
Selectiveness: Compulsory; **Completion**: State exam	
Profile course: - **Core course:** -	
Form, extent, and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars, or clinical practice	Lectures: 2.0 Practical classes 0.0 Lab exercises 0.0
Methods by which the educational activity is delivered	The present form of education
Methods for achieving learning outcomes	guided discussion/interviews/colloquium utilizing direct method/peer learning/buzz groups; presentations; simulations of real foreign language environment; continuing oral and/or written knowledge assessment; feedback
Number of credits: 10	
Study workload: 300 hours; Study workload: 300 hours; 200h (consultations + exam) 100h (self-study)	
Recommended term of study: 1. year, summer semester	
Level of study: 3	
Required subsidiary courses: Prerequisites: Co-requisites:	

Course requirements:

Continuous assessment/evaluation:

Active participation in language learning in the scope of two semesters. During this period, the student is to complete the following duties (activities) related to the issues addressed in his/her dissertation:

– preparation of a scientific article in a foreign language in the required format.

– preparation and delivery of a professional presentation.

Both activities will be summarised by percentage (0 – 100%). The percentage obtained for successful completion of language learning reflects the quality of knowledge and skills acquisition in accordance with the learning objective.

Final assessment/evaluation:

An oral examination before a committee consists of a "presentation of a professional text" part and a "conversation regarding professional and specialised topics" part. For the final evaluation of the World Language course, the committee also takes into account the percentage of success in language learning. The final course evaluation is governed by Directive No. 110 Study Regulations for the Third Degree of the University Study at the University of Žilina.

The minimum score for registration for the exam is not specified.

Forms and methods of assessment	Predetermined weight %	Field of knowledge, skills, and competencies
Successful completion of language education	40	presentation skills, language productive skills, independence, creativity, dealing with professional texts
evaluation by the state examination committee	60	professional knowledge; professional text handling, presentation skills; information handling; independence

Education outcomes:

English for Specific Purposes education aims at the student's intentional acquisition of new linguistic competencies in the field of so-called soft skills together with the development of vocabulary in the thematic areas of theoretical electrical engineering. In the language learning process, the student develops and

reinforces existing linguistic competencies and simultaneously acquires those relevant to academic practice within the study programme context.
The student can effectively use linguistic means to express attitudes, present his/her own conclusions, and formulate ideas, arguments, and scientific conclusions in the world language. The student is familiar with and uses academic and professional presentation and writing techniques during his/her study in the relevant study programme. The student can correctly reinterpret a professional text in a world language and independently prepare his/her own text based on the results of scientific research. The student shall be able to actively participate in teamwork and simultaneously independently present respective findings and/or conclusions at various international events, including conferences.
During the foreign study stay, the student shall be able to perceive the cultural differences between the home and host country and the acquired knowledge, skills and strategies will enable him/her to act expertly at an international level.

Course scheme:
Active participation in language education in the scope of two semesters (1st and 2nd study semester). During this period of study, the student is to complete the following duties (activities) related to the issues addressed in his/her dissertation:
– preparation of a scientific article in a foreign language in the required format.
– preparation and delivery of a professional presentation.
2. Content processing of approx. 100-150 pages of professional text related to the topic of the dissertation (determined in cooperation with the supervisor), presentation of the acquired knowledge in the world language during the examination in the scope of up to 15 minutes.
3. Preparation for conversational topics corresponding with the professional text and specialized topics on which the doctoral student will give his/her opinion in the examination discussion:
– Topic of my dissertation.
– Characterization of my workplace.
– Doctoral study in my field of study.
– Current state and global trends in the field of my dissertation.
– Opportunities to study abroad.

Recommended literature:
[1] 100-150 pages of the professional text prescribed by the supervisor according to the topic of the dissertation within the doctoral student's specialization.
[2] Professional literature recommended by the supervisor in the selected world language.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Lecture: doc. Ing. Branko Babušiak, PhD.
Lecture: doc. Ing. Mariana Beňová, PhD.
Lecture: doc. Ing. Štefan Borik, PhD.
Lecture: prof. Ing. Ladislav Janoušek, PhD.
Lecture: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-08-01 10:11:02.560

The person responsible for the course: prof. Ing. Ladislav Janoušek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0E003	**Course name:** Selected Chapters from Mathematics (VSM)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: - **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 2 Seminars: 0 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Lectures: lectures implementing problem-solving methods, interactive lectures with discussion, lectures with multimedia support, discussion, consultancy with feedback.
Number of credits: 10	
Study workload: 300 hours; 2h*13 (on-site education) 100h (project based learning) 74h (consultancy on project) 100h (self-study)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow the requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

The concrete way of assessment of the work in the semester and examination will be specified at the beginning of the semester by the teacher of the subject.

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	40	Professional knowledge, work with information, independence
1 presentation	10	Work with information, individual and team work, discussion abilities
Oral examination	50	Professional knowledge, presentation skills

Course outcomes:

Students can analyse information acquired by studying applied mathematics from professional publications.

Students are able to asses, to select important facts and to evaluate relevant connections according to the dissertation thesis.

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and required mathematical calculations.

Student can individually present results of their assignment in front of professional public in accordance to the dissertation thesis objectives.

Course scheme:
1st range of topics - Mathematical analysis: Integral calculus, Functions of complex variable, Functional series, Integral transformations, Ordinary differential equations, Partial differential equations, Eigenfunctions of linear differential operators, Functional analysis, Vector analysis, Special functions.
2nd range of topics – Algebra: Algebraic equations, Linear algebra, Linear transformations, Matrix analysis.
3rd range of topics – Possibility theory, Mathematical statistics: Theory of random events and processes, Regression and correlation, Theory of stochastic processes, Markov's processes.
4th range of topics – Numerical analysis: Partial differential equations, Numerical solution of partial differential equations, Ordinary differential equations, Numerical analysis of ordinary differential equations.
5th range of topics – Discrete mathematics: Graph theory, Theory of difference equations, Mathematical logic, Fuzzy logic, Numbers theory, Coding theory.
5th range of topics – Others: Tensor calculus, Mathematical modelling of dynamic systems, Mathematical programming and algorithms.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Lecture: doc. Mgr. Branislav Ftorek, PhD.

Last updated: 2022-03-16 12:21:16.923

The person responsible for the course: doc. Mgr. Branislav Ftorek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE03	**Course name:** Analysis and Processing of Signals in BME (ASSBMI)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow the requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Definition of basic terms - signal, noise, signal distribution. Biosignals - definition, distribution, and basic properties of selected biosignals. Artifacts in biological signals.

2. Random signals - numerical characteristics (mean, variance, standard deviation, ...) and functional dependencies (distribution function, probability density function, correlation, convolution, covariance, and

linear regression).
3. Digital filters with infinite and finite impulse response - differential equation, filter design procedure. Comparison of filters.
4. Spectral analysis of signals - discrete Fourier transform (DFT), short-time Fourier transform (STFT), power spectral density (PSD) estimation, cross power spectral density, and coherence function.
5. Two-dimensional Fourier transform. Image filtering, filter types, and sharpening filter.
6. Wavelet transform (WT). Continuous and discrete WT, wavelet decomposition – the principle of calculation and applications.
7. Electrocardiography (ECG) - ECG signal generation and acquisition. Meaning of the ECG waveform. ECG analysis - Pan-Tomkins algorithm, HRV analysis.
8. Electroencephalography (EEG) - EEG signal generation and acquisition, distribution of brain activities. Topographic mapping of brain activity. Brain-computer interface.
9. Advanced signal processing techniques - adaptive filtering, signal classification. Use of MATLAB programming environment and Signal processing toolbox, Image processing toolbox for digital signal and image processing.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Branko Babušiak, PhD.
Seminars: doc. Ing. Štefan Borik, PhD.

Last updated: 2022-03-17 11:17:04.753

The person responsible for the course: doc. Ing. Branko Babušiak, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE04	**Course name:** Applied Electromagnetism (AEM)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project-based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess, and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Energy, force, and thermal effects of EM field: heat sources, cooling systems, surface heating of metals by HF field, diathermy and hyperthermia in medicine.
2. Information transmission by EM waves, types of EM waves, power transmission, modulation of EM waves, transmission distortion, wave reflection, interference, and diffraction.

3. Doppler phenomenon in the field of electromagnetic waves.
4. Electromechanical analogies: electrical and mechanical oscillations, electrical and hydrodynamic long lines, propagation of a pressure wave in an elastic tube, modelling of the blood system.
5. Electromechanical transducers and electroacoustic transducers, sources and detectors of ultrasound, ultrasonic flaw detection, ultrasonography.
6. Investigation of materials using EM methods, scattering and reflection of EM waves on environmental inhomogeneities, Rayleigh's law, wave diffraction.
7. Evanescent EM wave: origin, propagation of the environment and the use of the phenomenon.
8. Polarization of EM waves: use for biomedical applications.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: prof. Ing. Milan Smetana, PhD.
Seminars: doc. Ing. Štefan Borik, PhD.

Last updated: 2022-03-17 11:22:36.493

The person responsible for the course: prof. Ing. Milan Smetana, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE05	**Course name:** Electromagnetic Methods of Non-Destructive Material Evaluation (EMNVM)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project-based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess, and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Non-destructive examination of materials: spectrum of used methods.
2. Types of material defects and possibilities of their detection.
3. Use of electromagnetic phenomena in non-destructive investigation of electrically conductive structures.

4. Eddy current method: use, implementation, evaluation of results.
5. Instrumentation in the examination of materials: implementation of the sensory part. Use of different types of detection elements.
6. Numerical methods and their use in EM field modelling in non-destructive investigation.
7. Evaluation and interpretation of detected signals. Possibilities of false interpretation.
8. Inverse and forward problem: possible solutions, importance, and implementation in practice.
9. Practical aspects and new trends in the field of electromagnetic non-destructive investigation.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: prof. Ing. Ladislav Janoušek, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 11:27:10.220

The person responsible for the course: prof. Ing. Milan Smetana, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE06	**Course name:** Electromagnetic Field and Biological Systems (EMPBS)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: incentive discussion, explanation, project-based learning, self-study using available resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

Basic properties of the electromagnetic field and the electromagnetic radiation in solids, electromagnetic parameters of biological objects. The electromagnetic radiation and its ionizing and non-ionizing spectrum, sources and effects, measurement of exposition (SAR). Effects of electric currents on biological objects, DC and AC currents, electrical accidents, and their prevention. An electrical activity of biological object and its

detection, detection and evaluation of the electric and the magnetic biological signals, diagnostic methods. Diagnosis based on the electromagnetic emission, thermovision, optical methods, X- and Gama rays, CT, PET, SPECT, NMR, optical spectroscopy. Therapeutical applications of the electromagnetic radiation, hyperthermia, phototherapy, radiotherapy, lasers in medicine. Thermal and non-thermal biological effects of the electromagnetic radiation.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Mariana Beňová, PhD.
Seminars: doc. Ing. Štefan Borik, PhD.
Seminars: prof. Ing. Ladislav Janoušek, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:14:14.360

The person responsible for the course: prof. Ing. Ladislav Janoušek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE07	**Course name:** Electromagnetic Waves Propagation in Bounded and Unbounded Media (SEMVP)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Introduction to EM waves in unbounded space
2. Electromagnetic waves
3. Plane EM wave in a lossless medium

4. Harmonic plane EM wave
5. Wave function of harmonic EM wave
6. EM wave propagation in a low-loss environment
7. EM wave propagation in a conductive medium
8. Dielectric parameters of substances
10. Magnetic parameters of substances
9. Wave impedance
10. Power transmitted by EM waves
11. Transmission of EM waves through the interface of two media

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Štefan Borik, PhD.
Seminars: prof. Ing. Ladislav Janoušek, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:21:24.950

The person responsible for the course: doc. Ing. Štefan Borik, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE08	**Course name:** Special Electromagnetic Measuring Methods in BME (SEMBMI)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess, and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Theoretical aspects of measurement methods: methods of evaluation and processing of measurement results. Deterministic and statistical methods of evaluation.
2. Uncertainties in measurement and their possible elimination. Prediction of measurement results.

3. Measurements of electrical and non-electrical quantities: use of suitable types of sensors.
4. Measurement chain: block diagram, feedback parameters, requirements for substructures.
5. Spectral analysis and the importance of its use in measurement.
6. Mechanical, thermodynamic, and optical measuring methods.
7. Wave imaging methods.
8. Tomographic imaging methods.
9. Measurement of parameters of biological systems using the quantum nature of EM waves.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Štefan Borik, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:21:24.950

The person responsible for the course: prof. Ing. Milan Smetana, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE09	**Course name:** Theory of Electromagnetic Circuits (TEO)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: incentive discussion, explanation, project-based learning, self-study using available resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

Fundamentals of electric circuits (EC) and their employment. Topology of EC. Energy conditions in EC. Linear EC, calculation methods, two-port networks and their immittance and transfer functions, frequency filters, resonance circuits, impulse transfer characteristics. Transient phenomena in linear EC. Linear EC powered by periodic and non-harmonic sources. Utilization of mathematical transformations for the EC analyses

(Fourier, Laplace), frequency analyses of signals, Fast Fourier Transformation, Wavelet Transformation. Non-linear EC, fundamental analyses methods, basic non-linear circuit elements. EC with electronic elements (diode, transistor, operational amplifier), EC with electronic elements as linear two-port networks. Linear EC with distributed parameters, homogenous long line, primary and secondary parameters, immittance and transfer characteristics, long line sections and their parameters.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Mariana Beňová, PhD.
Seminars: prof. Ing. Ladislav Janoušek, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:30:14.340

The person responsible for the course: doc. Ing. Mariana Beňová, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE10	**Course name:** Theory of Electromagnetic Field (TEM)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: incentive discussion, explanation, project-based learning, self-study using available resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

Fundamentals of electromagnetic (EM) field and its description; basic EM field quantities, their definition and mutual relations. Electrostatic field, distribution of electrostatic field quantities around point charges and charged conductive bodies. Electric field in dielectric environments. Energy and forces of electric field. Stationary field of electric current. Distribution of stationary electric field quantities around conductors

carrying stationary electric current, conductance. Stationary magnetic field, distribution of the magnetic field quantities around conductors carrying stationary electric current, inductance. Magnetic field in magnetic environments. Energy and forces of magnetic field. Non-stationary electromagnetic field. Electromagnetic induction, displacement current. Maxwell equations. Wave character of electromagnetic field, wave equations of electromagnetic field. Plane harmonic electromagnetic wave, wave impedance, propagation constant, wave propagation into perpendicular interface, wave reflection from interface of two environments. Electromagnetic wave in dielectric and lossy environment. Energy transfer using electromagnetic wave. Poynting's vector.

Literature:

Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:

Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:

Seminars: doc. Ing. Štefan Borik, PhD.
Seminars: prof. Ing. Ladislav Janoušek, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:41:04.003

The person responsible for the course: prof. Ing. Ladislav Janoušek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE11	**Course name:** Wave Processes in Materials (VPL)
Course selectiveness: Compulsory Elective; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 2 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Seminars: controlled discussion, explanation, project-based learning, self-study with electronic resources, experiment, simulations, programming, question-answer method, project work.
Number of credits: 10	
Study workload: 300 hours; 2h*13+0h*13+0h*13 (on-site education) 100h (self-study) 174h (project based learning)	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	

Course requirements:

Continuous assessment / evaluation:

Students complete an individual project in which they process selected topics from the course scheme based on the objectives of their dissertation theses. They will follow requirements of their supervisors and course teacher. Project results will be presented during the oral examination in front of the committee.

Final assessment /evaluation:

Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
1 implemented project assignment	35	Professional knowledge, work with information, independence
1 presentation	15	Presentation skills
Oral examination	50	Professional knowledge

Course outcomes:

Students can critically assess and select methods suitable for the solution of a problem and tasks defined in the semester assignment.

Students demonstrate the application of selected methods in the design of simulation models and calculations.

Students evaluate obtained results and implement them in the scientific paper.

Students formulate a project text that will be applied within their dissertation theses.

Students can present the output of their works.

Students, based on obtained knowledge, can assess and explain the efficiency of the application of selected methods in terms of their dissertation theses.

Course scheme:

1. Wave properties of EM waves, wave equations, harmonic solutions, information and energy transfer by waves.
2. EM waves at the interface of two homogeneous media, reflection, refraction, surface wave.
3. Mechanical waves, wave equation, bulk and surface acoustic waves, passage of waves across the interface

of two media, acoustic pressure and intensity of waves.
4. Interference and diffraction phenomena, holography. Interaction of EM and AC waves in matter media, light deflectors, EMAT.
5. Quantum wave manifestations, photon, phonon, basic phenomena (photomultiplier, photoconductivity, LED, photodetectors, lasers, thermoelectric phenomena).
6. Spectra of substances, spectroscopy.
7. Wave imaging, optical and ultrasound imaging methods, resolution, Doppler phenomenon, X-ray imaging, electron beam imaging, electron microscope. Tunneling scanning and atomic force microscope. Tomography. Practical application of various phenomena and principles.

Literature:
Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminars: doc. Ing. Štefan Borik, PhD.
Seminars: prof. Ing. Milan Smetana, PhD.

Last updated: 2022-03-17 12:44:48.137

The person responsible for the course: doc. Ing. Štefan Borik, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE01	**Course name:** Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination (DS)
Course selectiveness: Compulsory; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 0 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	consultations, invidual work with professional literature sources, observation, simulation, programming, model creation, experiments preparation, self-study, conclusions formulation
Number of credits: 10	
Study workload: 300 hours; 100h (consultations + exam) 200h (self-study)	
Recommended semester/term of study: summer, 2. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: Foreign Language, Basics of Research Practice, two selected courses from the compulsory elective courses based on the topic of the dissertation thesis	
Course requirements: Continuous assessment / evaluation: - Final assessment /evaluation: The subject is a state exam. The evaluation of the dissertation exam and the defence will be performed by the dissertation defence commission, taking into account the opinion of the opponent of the written work for the dissertation examination. The examination commission decides on the result of the examination in a closed session. Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina.	

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
External evaluation by a state examination committee	100	Professional knowledge, creative problem solution, knowledge integration, formulation of individual decisions, presentation competences, work with information, independence

Course outcomes:

Students can explain and present deep systematic knowledge from the study branch Electrical Engineering at the 3rd degree of university studies in Slovak and in English languages in respect to the Theory of Electrical Engineering. Students are able to introduce gained competences and methods of scientific work connected to the given field of study and they are able to present state of the art in the Electrical Engineering field connected to the subject of a dissertation thesis.

Students can critically assess and select methods suitable for the solution of problems and tasks connected to electromagnetic systems and electromagnetic field. They are able to classify and to categorize interactions of electromagnetic field with various systems.

Students are able to built-up a complex calculation model of an evaluated problem, analyse it and critically asses gained results. They are able to explore practical exploitations of electromagnetic phenomena in selected areas together with effects connected to those phenomena.

Students can confront results of their work, while they are able to justify selection and employment of

applied methods and approaches in the field of the Theory of Electrical Engineering. They can present results in prescribed form of final reports, projects, or professional publications. They are able to argue, to state conclusions and to discuss about their scientific work in front of professionals.

Course scheme:

The course focus individually depends on issues that students will address in their dissertation. Obtaining data from information sources, introduction to theoretical and experimental elaboration of selected parts of the dissertation takes place throughout the first part of the study. The course is organized in the form of individual consultations aimed at solving work issues and ongoing supervision of work solutions. After the elaboration and submission of the written work for the dissertation examination, an reviewer of the written work for the dissertation examination will prepare the evaluation report. During the state exam, a student will present his / her written work for the dissertation exam, respond to the reviewer's comments and the comments made by the members of the commission during the discussion. The commission will also specify the objectives of the dissertation to a student.

Literature:

Based on a selected range of topics and dissertation objectives.

Instruction language: English

Notes:

Course evaluation:

Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:

Last updated: 2022-03-14 14:07:13.887

The person responsible for the course: prof. Ing. Ladislav Janoušek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D0FE02	**Course name:** The Thesis and Dissertation Defence (DP)
Course selectiveness: Compulsory; **Course ending:** State exam	
Profile course: yes **Core course:** yes	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 Seminars: 0 Lab.exercises: 0
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	consultations, invidual work with professional literature sources, observation, simulation, programming, model creation, experiments preparation, experimental individual and team work in laboratory, processing and analyses of research data, problem solution, self-study, conclusions formulation
Number of credits: 30	
Study workload: 900 hours; 200h (consultations + exam) 700h (self-study)	
Recommended semester/term of study: summer, 3. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: Essay to Dissertation Examination and Defence of Written Project for Dissertation Examination Co-requisites: -	
Course requirements: Continuous assessment / evaluation: - Final assessment /evaluation: The subject is a state exam. The evaluation of the dissertation thesis and its defence is realises by a dissertation thesis defence commission, taking into account the reports of the dissertation thesis reviewers. The defence commission decides on the result of the defence in a closed session. Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina.	

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
External evaluation by a state examination committee	100	Professional knowledge, creative problem solution, knowledge integration, formulation of individual decisions, presentation competences, work with information, independence

Course outcomes:

Students can explain and present deep systematic knowledge from the study branch Electrical Engineering at the 3rd degree of university studies in Slovak and in English languages in respect to the Theory of Electrical Engineering. Students are able to introduce gained competences and methods of scientific work connected to the given field of study and they are able to present state of the art in the Electrical Engineering field connected to the subject of a dissertation thesis.

Students can analyse complex problems from the Theory of Electrical Engineering field in line with information acquired during self-study. Students can critically assess solution of problems and tasks connected to electromagnetic systems and electromagnetic field.

Students can individually react and solve unpredictable situations and they can apply higher determination level in the processes of experiments realisation and numerical models design. Students are able to built-up a complex calculation model of an evaluated problem, analyse it and critically asses gained results. They are able to explore practical exploitations of electromagnetic phenomena in selected areas together with effects

connected to those phenomena.
Students can confront results of their work, while they are able to justify selection and employment of applied methods and approaches in the field of the Theory of Electrical Engineering. They can present results in prescribed form of final reports, projects, or professional publications. They are able to argue, to state conclusions and to discuss about their scientific work in front of professionals.
Students can prepare, elaborate and submit expert documents with high added value in the field of Theory of Electrical Engineering.
Students can interpret gained scientific results at different levels. They demonstrate that a few of their original research manuscripts are accepted for publication after review process while at least one of them is accepted for publication in scientific journal.
Students can present their research activities as a rigorous process of gaining new scientific results that shift the knowledge border in a given field. They prove that they individually realised major part of the scientific results – design, elaboration, realisation, optimisation – in line with the ethical codex.
Students can knowledgeable solve problems from the Theory of Electrical Engineering in its broader context employing their creative approach, innovative thinking and critical assessment of a situation. Students demonstrably contribute to a technical development and to a social progress in scientific or professional field using gained results.

Course scheme:
The course focus individually depends on issues that students will address in their dissertation. Obtaining data from information sources, introduction to theoretical and experimental elaboration of selected parts of the dissertation takes place throughout the whole study. The course is organized in the form of individual consultations aimed at solving work issues and ongoing supervision of work solutions. After the elaboration and submission of the dissertation thesis, a supervisor and reviewers prepare the evaluation reports. During the state exam, a student presents his / her dissertation thesis, respond to a supervisor and reviewers' comments and the comments made by the members of the commission during the discussion.

Literature:
[1] Professional literature based on a supervisor advice.
[2] Katuščák, D.: Ako písať záverečné a kvalifikačné práce, Enigma, 2007, 162 strán, ISBN 8089132454.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:

Last updated: 2022-03-14 14:11:01.397

The person responsible for the course: prof. Ing. Ladislav Janoušek, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)

University: University of Žilina	
Faculty: Faculty of Electrical Engineering and Information Technology	
Course ID: 3D00E05	**Course name:** University Pedagogy (VP)
Povinnosť predmetu: Optional; **Ukončenie:** Exam	
Profile course: - **Core course:** -	
Form, extent and method of teaching activities:	
Number of classes per week in the form of lectures, laboratory exercises, seminars or clinical practice	Lectures: 0 classes Seminars: 2 classes Lab.exercises: 0 classes
Methods by which the educational activity is delivered	Present form of education
Applied educational activities and methods suitable for achieving learning outcomes	Teaching is carried out in blocks - in the total range of 20 hours: interactive lectures with discussion and problem interpretation; solving authentic problems, case studies; role-playing; cooperative/collaborative teaching; peer learning; skills training; workplace learning, providing feedback; activating strategies, methods, and techniques of higher education, self-evaluation
Number of credits: 2	
Study workload: 60 hours; 20h full-time + 20h preparation, implementation, and self-assessment of activating teaching of the assigned course + 20h self-study = 60 hours	
Recommended semester/term of study: summer, 1. year	
Study degree: 3	
Required subsidiary courses: Prerequisites: - Co-requisites: -	
Course requirements: Continuous assessment / evaluation: During the training at the seminars, doctoral students will solve authentic problems, case studies, and, in the role of students, they will gradually create their methodological portfolio of applications in the course they teach. They will independently design activating teaching. After consulting with the teacher, they implement it and then reflect on their pedagogical activities. Final assessment /evaluation: Article 9 of UNIZA Directive no. 110, The Study Regulations for the third degree of university studies at the University of Žilina, specifies the final assessment by the mark.	

Forms and methods of assessment	Predetermined weight %	Area of knowledge, skills and competence
methodological portfolio	20%	professional knowledge, peer learning, working with information, independent creative activity and decision-making
2 self-reflective sheets	10%	work with information, independence, reflection of own activity
activating teaching	70%	professional knowledge, creativity, self-reflection, presentation skills, competence: psycho-didactic, communicative, organizational, managerial and diagnostic

Course outcomes:
The doctoral student will explain the basic principles of effective planning, preparation, implementation, and evaluation of student-oriented higher education.
He/She actively trains the employment of students in simulated situations resulting from team university teaching.
In a group discussion, he/she makes suggestions, uses examples to illustrate and argue their specific use in teaching.

He/She creatively designs and, with the support of the teacher, implements activating teaching based on predetermined requirements.
He/She demonstrates the ability to apply the acquired knowledge, skills, and competencies in education.
He/She justifies the suitability of using individual activating strategies, teaching methods, and techniques concerning activating students in teaching.
During the self-reflection, he/she will describe his/her pedagogical activity in activating teaching and suggests further possibilities of improvement.

Course scheme:
Basic principles of effective planning, preparation, implementation, and evaluation of full-time and online teaching at the university. The personality of a university student, the personality of a doctoral student, and his/her pedagogical activity. Effective learning and motivation of university students. Learning objectives, choice of teaching methods, and evaluation of learning outcomes. Activating higher education strategies.

Literature:
[1] Bajtoš, J. (2013). Didaktika vysokej školy. Bratislava: IURA EDITION.
[2] Mužík, J. Mužík, J. (2004). Androdidaktika. Praha: ASPI.
[3] Plamínek, J. (2014). Vzdělávání dospělých. Praha: Grada.
[4] Sirotová, M. (2014). Vysokoškolský učiteľ v edukačnom procese. Trnava: UCM FF.
[5] Slavík, M., et al. (2012). Vysokoškolská pedagogika. Praha: Grada.
[6] Turek, I. (2006). Základy didaktiky vysokej školy. Bratislava: STU.
[7] Vašašová, Z., et al. (2016). Psychológia učenia dospelých. Banská Bystrica: UMB.

Instruction language: English

Notes:

Course evaluation:
Total number of evaluated students: 0

A	B	C	D	E	FX
0 %	0 %	0 %	0 %	0 %	0 %

Course teachers:
Seminar: Mgr. Gabriela Chalupianská
Seminar: PaedDr. Lenka Môcová, PhD.
Seminar: Mgr. Jana Trabalíková, PhD.

Last updated: 2022-08-09 08:00:24.793

The person responsible for the course: Mgr. Jana Trabalíková, PhD.

Approved by: prof. Ing. Ladislav Janoušek, PhD. (study programme guarantor)