DEPARTMENT OF ELECTROMAGNETIC AND BIOMEDICAL ENGINEERING

1 General Information

The original name of the department, founded in 1953 as a part of the Faculty of Electrical Engineering of the University of Railways in Prague, was the Department of Theoretical Electrical Engineering and Electric Machines.

After separating the Electric Machines section, the education orientation of the Department was partly changed. For that reason the department was renamed to the Department of Theoretical Electrical Engineering in 1986. Since 1989, after spreading the teaching subjects to non-electrical branches of study of other faculties of the University of Žilina, the department was renamed to the Department of Theoretical and Applied Electrical Engineering.

Due to reorganization in 2005 the department has been divided into two independent departments which are Department of Electromagnetic and Biomedical Engineering (DEBE) and the Department of Measurement and Applied Electrical Engineering.

At present, the Department of Electromagnetic and Biomedical Engineering has two divisions. The Division of Electromagnetic Engineering provides courses and lectures of Theory of Electrical Engineering 1, 2, 3, 4, Seminar of Theory of Electrical Engineering 1, 2, Fundamentals of Electromagnetic Compatibility for the students of the Faculty of Electrical Engineering. The Division of Biomedical Engineering provides teaching of some interdisciplinary and special subjects for the students of Biomedical Engineering study field. There are mainly the following subjects: Wave Processes, Sensors and Measuring Methods in Biomedicine, Radiation and Protection against Radiation, Instrumentation in Medicine, Fundamentals of Ecology, Bachelor Project BME, Diploma Project and Diploma Seminar.

After the official accreditation of the master study of Biomedical Engineering (BME) in 2000 at the Faculty of Electrical Engineering, the department became the responsible one for the education and professional level of the study field BME. In 2004 the Biomedical Engineering study field has been reaccredited for two grades study - Bachelor and Master degrees. The DEBE guarantees the BME in cooperation with the Jessenius Medical Faculty of the Comenius University in Martin.

Along with the BME, the Department of Electromagnetic and Biomedical Engineering is the main responsible one for the postgraduate doctoral study in the Theory of Electrical Engineering (TEE). The staff of the DEBE guarantees and provides the courses for the PhD. study in TEE.

All educational activities of DEBE are performed for the students of the Faculty of Electrical Engineering of the University of Žilina.

The research activities of the department are aimed mainly to the following topics: investigation of electromagnetic field and its interactions with various media, methods and tools of material non-destructive evaluation, problems of electromagnetic compatibility and biocompatibility, biomedical sensors and modelling and simulations of dynamic biological systems mainly for the use in medical diagnostics.

2 Staff of the Department

Head of the Department : Klára Čárová
Vice-head of the Department : Ladislav Janoušek
Secretary : Daniela Gombárska
Administrative Support : Ester Kyselová
2.1 Sections of the Department

2.1.1 Section of Electromagnetic Engineering

Head of the Section : Vilibalda Darmová
Professors : Klára Čápvá
Associate Professors : Ladislav Janoušek
Senior Lecturers (with PhD) : Vilibalda Darmová, Stanislav Hurta

2.1.2 Section of Biomedical Engineering

Head of the Section : Mariana Beňová
Professors : Ivo Čáp
Associate Professors : Dagmar Faktorová (to 15th July 2007)
Senior Lecturers (with PhD) : Mariana Beňová (from 16th July 2007),
Daniela Gombárská,
Zuzana Pšenáková (from 1st October 2007)

2.1.3 Administrative and Technical Support

Administrative Support : Ester Kyselová

2.1.4 Postgraduate Students

Internal (full-time) : Barbora Czippelová (from 1st October 2007), Tomáš Marek (to 19th June 2007), Zuzana Pšenáková (to 30th September 2007), Milan Smetana, Tatiana Strapáčová (from 1st October 2007)

2.1.5 External teachers (Biomedical Engineering)

Professors : Kamil Javorka 1), Albert Stránsky 1), Ján Jakuš 1),
Ján Lehotský 1), Elena Kukurová 2), Vít Šajter 3)
Associate Professors : Michal Javorka 1), Yvetta Mellová 1), Martin Péč 1),
Mária Nemčeková 1), Ivan Režňák 1)
Senior Lecturers : Hubert Poláček 1), Viera Jakušová 1), Michal Weis 2),
Jitka Mohylová 4), Jana Šutá 5)
1) Jessenius Medical Faculty of the Comenius University in Martin
2) Medical Faculty of the Comenius University in Bratislava
3) Slovak Health Service University in Bratislava
4) Technical University in Ostrava, Czech Republic
5) Hospital with Policlinic in Žilina

3 Teaching

3.1 Courses in Bachelor and Master Degree Programmes

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Lessons-Seminars-Exercises</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Semester</td>
<td>hours/week</td>
</tr>
<tr>
<td>3B203</td>
<td>Theory of Electrical Engineering 1</td>
<td>2</td>
<td>3 – 3 – 0</td>
</tr>
<tr>
<td>3B210</td>
<td>Theory of Electrical Engineering B</td>
<td>2</td>
<td>3 – 3 – 0</td>
</tr>
<tr>
<td>3B213</td>
<td>Seminar on TEE 1</td>
<td>2</td>
<td>0 – 2 – 0</td>
</tr>
<tr>
<td>3B308</td>
<td>Theory of Electrical Engineering 2</td>
<td>3</td>
<td>3 – 3 – 0</td>
</tr>
<tr>
<td>3B324</td>
<td>Seminar on TEE 2</td>
<td>3</td>
<td>0 – 2 – 0</td>
</tr>
</tbody>
</table>
### 3.2 Courses in Doctoral Degree Programmes

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Lessons-Seminars-Exercises</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Semester</td>
<td>hours/week</td>
</tr>
<tr>
<td>3D230</td>
<td>Theory of Electromagnetic Field</td>
<td>1</td>
<td>2 – 0 – 0</td>
</tr>
</tbody>
</table>

Within the framework of the cooperation with the external teachers from Jessenius Medical Faculty of the Comenius University in Martin, Medical Faculty of the Comenius University in Bratislava, Slovak Health-Service University in Bratislava, Technical University in Ostrava and Hospital with Polyclinic in Žilina the following courses for the students of BME are provided:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Lessons-Seminars-Exercises</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D230</td>
<td>Theory of Electromagnetic Field</td>
<td>1</td>
<td>2 – 0 – 0</td>
</tr>
</tbody>
</table>
Courses of the Faculty of Civil Engineering

4D250 Theory of Measurement 2 2 – 0 – 0 Čáp
4D102 Applied Physics 2 2 – 0 – 0 Čáp
4D109 Selected Parts of Physics 2 2 – 0 – 0 Čáp

4 Educational, Research and Scientific Projects

4.1 Research Projects Funded by the Grant Agencies of the Slovak Republic

Title: Design and Optimization of Electromagnetic and Acoustic Methods and Tools for Material Non-destructive Testing (VEGA 1/2053/05)
Coordinator: Klára Čápová
Co-operators: Mariana Beňová, Ivo Čáp, Vilibalda Darmová, Dagmar Faktorová, Daniela Gombárska, Ladislav Janoušek, Tomáš Marek, Milan Smetana

Title: Interaction of Discharge in Dielectrics and Electron Gas in Conductors with Ultrasound and Laser Radiation (VEGA 1/2017/05)
Coordinator: Ivo Čáp
Co-operators: Klára Čápová

4.2 International Projects

The following projects were solved within the framework of international scientific cooperation of the department with the IIU Corp., Tokyo, Japan:

Title: Development of the Software for the JNES Project (06-NDT-01)
Coordinator: Daniela Gombárska

Title: Detecting Tiny Magnetic Particles in Oil (06-NDT-02)
Coordinator: Ladislav Janoušek
Co-operators: Daniela Gombárska, Milan Smetana
Title: Investigation of a New Probe with Array of Pick-up Coils for Enhancing Crack Evaluation (06-NDT-04)
Coordinator: Ladislav Janoušek

4.3 Internal Research Projects

Title: Modelling and Computer Simulation Methods for Investigation of Brain Biological System Properties (13/06)
Coordinator: Klára Čápová
Co-operators: Ivo Čáp, Vilibalda Darmová, Dagmar Faktorová, Daniela Gombárka, Ladislav Janoušek, Zuzana Pšenáková

4.4 Other Projects

Title: University Study Programs for European Employment Market (ESF - SOP L'Z – 2005/NP1-007, project code 112 3010 0438)
Coordinator: Ivo Čáp – university coordinator
Co-operators: Klára Čápová – scientific guarantee at FEE

Title: Establishment of centre for training in scientific work – incubator of doctoral students (ESF – SOP L'Z - 11230100433) Project JLF UK Martin
Member of the project council: Klára Čápová
Faculty coordinator JLFUK: Kamil Javorka

5 Co-operation

5.1 Co-operation Partners in Slovakia

- Slovak technical University, Bratislava
- Technical University, Košice
- Jessenius Medical Faculty of the Comenius University, Martin
- Medical Faculty of the Comenius University, Bratislava
- University of A. Dubček, Trenčín
- Technical University in Zvolen, Zvolen
- Department of Electronics, The Academy of Armed Forces, Liptovský Mikuláš
- Constantine the Philosopher University in Nitra, Nitra
- Institute of Measurement Science SAŠ, Bratislava
- Slovak Institute of Metrology, Bratislava
- Hospital with Policlinic, Žilina
- Hospital of Jessenius Medical Faculty of the Comenius University, Martin
- Office of Nuclear Supervision of SR, Trnava
- VÚJE, Trnava
- Atómové elektrárne, Jaslovske Bohunice
- Slovenské elektrárne a.s., Jaslovske Bohunice
- Vodné dielo Žilina, Vodohospodárska výstavba š.p., Bratislava

5.2 International Co-operation Partners

- IIU Corp., Tokyo, Japan
- Keio University, Yokohama, Japan
- University of Kanazawa, Japan
- University of Tokyo, Japan
- Norwegian University of Science and Technology, Trondheim, Norway
- Technical University RWTH, Aachen, Germany
- University of Technology, Compiegne, France
- Technical University, Graz, Austria
5.3 Visits to Foreign Institutions

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klára ČÁPOVÁ</td>
<td>National University of Ireland, Dublin, Ireland</td>
<td>7 days</td>
</tr>
<tr>
<td></td>
<td>Universita di Roma, Roma, Italy</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>FEE ZČU, Plzeň, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>FEE ČVUT, Prague, Czech Republic</td>
<td>4 days</td>
</tr>
<tr>
<td>Ivo ČÁP</td>
<td>Universitát Potsdam, Postupim, Germany</td>
<td>7 days</td>
</tr>
<tr>
<td></td>
<td>National University of Ireland, Dublin, Ireland</td>
<td>7 days</td>
</tr>
<tr>
<td></td>
<td>Universita di Roma, Roma, Italy</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>European Committee, DG R&amp;D, Brussels, Belgium</td>
<td>7 days</td>
</tr>
<tr>
<td></td>
<td>University of Isfahan, Iran</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>FBME ČVUT, Kladno, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>PF OU, Ostrava, Czech Republic</td>
<td>1 day</td>
</tr>
<tr>
<td>Barbora CZIPPELOVÁ</td>
<td>FBME ČVUT, Kladno, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td>Vilibalda DARMOVÁ</td>
<td>FEE ZČU, Plzeň, Czech Republic</td>
<td>2 days</td>
</tr>
<tr>
<td>Ladislav JANOUŠEK</td>
<td>Cardiff University, Cardiff, UK</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>TU RWTH, Aachen, Germany</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>FEE ZČU, Plzeň, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>FEE ČVUT, Prague, Czech Republic</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>CNDT, Prague, Czech Republic</td>
<td>1 day</td>
</tr>
<tr>
<td>Zuzana PŠENÁKOVÁ</td>
<td>FEI VŠB-TU, Ostrava, Czech Republic</td>
<td>1 day</td>
</tr>
<tr>
<td>Milan SMETANA</td>
<td>FBME ČVUT, Kladno, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>FBME ČVUT, Kladno, Czech Republic</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>CNDT, Prague, Czech Republic</td>
<td>1 day</td>
</tr>
</tbody>
</table>

5.4 Visitors from Foreign Institutions

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vladimír BLAZEK</td>
<td>TU RWTH Aachen, Aachen, Germany</td>
<td>4 days</td>
</tr>
<tr>
<td>Anrraoi de PAOR</td>
<td>National University of Ireland, UCD, Belfield, Dublin, Ireland</td>
<td>3 days</td>
</tr>
<tr>
<td>Emer DOHENY</td>
<td>National University of Ireland, UCD, Belfield, Dublin, Ireland</td>
<td>3 days</td>
</tr>
<tr>
<td>Václav HAVLIČEK</td>
<td>FEE ČVUT, Prague, Czech Republic</td>
<td>4 days</td>
</tr>
<tr>
<td>Jan VRBA</td>
<td>FEE ČVUT, Prague, Czech Republic</td>
<td>2 days</td>
</tr>
<tr>
<td>Daniel MAYER</td>
<td>FEE ZČU, Plzeň, Czech Republic</td>
<td>2 days</td>
</tr>
<tr>
<td>Jitka MOHYLOVÁ</td>
<td>TU VŠB, Ostrava-Poruba, Czech Republic</td>
<td>8 days</td>
</tr>
</tbody>
</table>
6 Other Activities

6.1 Specialised Lectures, Courses Organized by the Department

Title of Lecture/Course: Preparation of the Slovak Representation Team for IPhO 2007
Customer: Ministry of education, Bratislava
Lecturer: Ivo Čáp
Date: 30th April – 4th May 2007

Title of Lecture/Course: National Meeting of Talents in Physics
Customer: Ministry of education, Bratislava
Lecturer: Ivo Čáp
Date: 4th – 9th November 2007

6.2 Solicited Lectures

Title of Lecture: Electromechanical Analogy Utilization for Dynamic Physiological Systems Modelling – Introduction
Lecturer: Klára Čápová
Where/When: NUI Dublin, Ireland / 23th April 2007

Title of Lecture: Investigation of Brain Haemodynamics by Analogical Electrical Modelling and Simulations
Lecturer: Klára Čápová
Where/When: NUI Dublin, Ireland / 24th April 2007

Title of Lecture: Pathological Cerebral Malformations Diagnostics by the Help of Computing Methods
Lecturer: Klára Čápová
Where/When: NUI Dublin, Ireland / 25th April 2007

Title of Lecture: Anomaly Penetration of EM Wave into Conducting Medium
Lecturer: Ivo Čáp
Where/When: NUI Dublin, Ireland / 23th April 2007

Title of Lecture: Electrons in Metals in Presence of EM and Acoustic Waves
Lecturer: Ivo Čáp
Where/When: NUI Dublin, Ireland / 24th April 2007

Title of Lecture: Direct EM Generation of Acoustic Waves in Metals and its Utilization in NDE
Lecturer: Ivo Čáp
Where/When: NUI Dublin, Ireland / 25th April 2007

Title of Lecture: Physics in Interesting Technical Applications
Lecturer: Ivo Čáp
Where/When: PdF UHK, Hradec Králové, Czech Republic / 14th November 2007

Title of Lecture: Increasing attraction of youth education in natural sciences within the Lisbon Strategy of EU
Lecturer: Ivo Čáp
Where/When: Olomouc, Czech Republic / 15th November 2007

6.3 Membership in Committees of International Institutions

Klára Čápová
- International Society COMPUMAG, Nottingham, UK
- International Scientific Committee of the AMTEE 2007 conference
Ivo Čáp
- International Scientific Committee of the conference “Trends in Biomedical Engineering”
- International Organising Committee of the ISEF 2007 conference
- Professional Board for PhD study field “Theory of Education of Physics”, Pedagogical Faculty of University Hradec Králové, the University of West Bohemia in Plzeň, and the University Ostrava, Czech Republic
- Professional Board for PhD study field “Specialisation in Pedagogy – Theory of Education in Physics”, Pedagogical Faculty of University Hradec Králové, Czech Republic
- International Scientific Committee of the conference “Trends in Biomedical Engineering”
- Editorial Board of the journal Československý časopis pre fyziku, Academy of Sciences of CR, Prague, Czech Republic
- Editorial Board of the journal Školská fyzika, University of West Bohemia in Plzeň, Czech Republic
- Independent Expert of EC for FP7 – program Science in Society (member of evaluation team for a call in 2007), Brussels, Belgium
- Scientific Board of Pedagogical Faculty Hradec Králové, Czech Republic
- International Board of the EUSO, Dublin, Ireland

Ladislav Janoušek
- Japanese Society for Non-Destructive Inspection, Tokyo, Japan

Zuzana Pšenáková
- IEEE, New York, USA

6.4 Membership in Committees of National Institutions

Klára Čárová
- Scientific Board of Jessenius Medical Faculty CU Martin
- Scientific Board of FEVT TU Zvolen
- Vice-head of the Joint Branch Committee for PhD. scientific field “Theory of Electrical Engineering”, Bratislava
- Faculty Branch Committee for the PhD. study field “Theory of Electrical Engineering”, FEI STU Bratislava
- Faculty Branch Committee for the PhD. study field “Bionics and Biomechanics”, FME TU Košice

Ivo Čáp
- Scientific Board of the KU Ružomberok
- Scientific Board of the Philosophical Faculty of the KU Ružomberok
- Faculty Branch Committee for PhD. study field “Physics of Condensed Matter and Acoustics”, Faculty of Science, UKF Nitra
- Faculty Branch Committee for the PhD. study field “Medical Biophysics”, Jessenius Medical Faculty CU Martin, PhD. supervisor in the field “Medical Biophysics”
- National coordinator of the European Union Science Olympiad, Bratislava
- Head of the Slovak Committee of Physics Olympiad, Bratislava
- Head of Preparation of the Representation Team for International Physics Olympiad, Bratislava
- Coordination Council of the Slovak Ministry of Education for students’ competitions, Bratislava
- Central Committee of the Slovak Mathematics and Physics Association, Bratislava
- Central Council of the Academy of Education, Bratislava
6.5 Membership in University Boards

Klára Čápová -
- Scientific Board of the Faculty of Electrical Engineering
- College of the Dean of the Faculty of Electrical Engineering
- Editorial Board of the journal Advances in Electrical and Electronic Engineering
- Academic Senate of the Faculty of Electrical Engineering
- Head of the Faculty Branch Committee for PhD. study field “Theory of Electrical Engineering”, Faculty of Electrical Engineering
- Faculty Branch Committee for PhD. study field “Marginal States of Materials”, Faculty of Mechanical Engineering
- International Scientific Committee of the TRANSCOM 2007 conference
- Administrative council of KAP, Faculty of Electrical Engineering
- Main Guarantee of the Bachelor and Master Degree study field “Biomedical Engineering”, Faculty of Electrical Engineering
- Main Guarantee of the PhD. Degree study field “Theory of Electrical Engineering”, Faculty of Electrical Engineering
- Main Guarantee of the procedures to habilitate and to inaugurate in the field “Theory of Electrical Engineering”, Faculty of Electrical Engineering
- PhD. supervisor in the field „Theory of Electrical Engineering“ and in the field „Bionics and Biomechanics“

Ivo Čáp
- Scientific Board of the Faculty of Civil Engineering
- Faculty branch Committee for PhD. study field “Theory of Electrical Engineering”, Faculty of Electrical Engineering
- PhD. supervisor in the field „Theory of Electrical Engineering“
- Editorial Board of EDIS publishing of the University of Žilina

7 Publications

7.1 Book Publications

Lecture Notes and Textbooks

7.2 Journals

Current Content Journals


Non-current Content Foreign Journals


Journals (SK)


7.3 Conference Proceedings

Foreign Reviewed Conference Proceedings


Reviewed Conference Proceedings (SK)


7.4 Other Publications


8 Contact Address

Department of Electromagnetic and Biomedical Engineering  
Faculty of Electrical Engineering  
University of Žilina  
Univerzitná 1, 010 26 Žilina  
Slovak Republic  
Phone: +421-41-513 2100, 2101  
Fax: +421-41-513 1519  
E-mail: ktebi@fel.uniza.sk  
www: http://fel.uniza.sk/ktebi

Katedra teoretickej elektrotechniky  
a biomedicínskeho inžinierstva  
Elektrotechnická fakulta  
Žilinská univerzita  
Univerzitná 1, 010 26 Žilina  
Slovenská republika