



UNIVERSITY OF BANJA LUKA FACULTY OF ELECTRICAL ENGINEERING



Patre 5 • 78000 Banja Luka • Republic of Srpska • Bosnia and Herzegovina
Central: +387 51 221 820 • Deanery : +387 51 221 824 • Fax: 387 51 211 408
E-mail: office@etfbl.net • www.etfbl.net

ICT Ph.D. study programme at the Faculty of Electrical Engineering - Organization and Implementation -

Mladen Veletić

About the Faculty of Electrical Engineering

- The Faculty of Electrical Engineering (FEE) is the oldest Faculty at the University of Banja Luka, **founded in 1962**, as the Department of the Technical Faculty of Banja Luka.
- In 1975 the Department was separated from the Technical Faculty, establishing the Faculty of Electrical Engineering.
- Departments:
 - The **Department of Electronics and Telecommunications**,
 - The **Department of Computer Science and Automatics**, and
 - The **Department of Power Engineering** (since 1995).

About the Faculty of Electrical Engineering (cont'd)

- Each year, 30-50 students receive a Diploma Engineer degree.
- There have been about 2000 students who graduated so far.
- **In addition to undergraduate programmes, the FEE also offers programmes at Master of Science and Doctoral (Ph.D.) level.** Postgraduate studies are organized for specialized areas depending on student interests. For the first time postgraduate studies were organized in 1971/72.

ECTS based Study Programmes

- The FEE adopted the **European Credit Transfer and Accumulation System (ECTS)** as a standard for comparing the study attainment and performance of students:
 - From academic 2004/05 at the **Undergraduate study programmes (8 semesters)**, and
 - From academic 2008/2009 at the **Master study programmes (2 semesters)**
- 1. Study programme for Computer Science and Informatics
- 2. Study programme for Electronics and Telecommunications
- 3. Study programme for Power Engineering and Industrial Systems
- From Academic 2009/2010 Ph.D. study programme

Ph.D. in Information and Communication Technology

Ph.D. in Information and Communication Technology

- Implemented by:
 - The **University of Banja Luka, FEE**, and
 - The **University of Paderborn, International Graduate School of Dynamic Intelligent Systems - TWINNING INSTITUTION**
- Coordinated by:
 - Dr Zdenka Babić, University of Banja Luka, and
 - Mr Ahmet Mehić, University of Paderborn
- Co-founded by:
 - Degree Development Structure (DDS), WUS Austria, Austrian Development Cooperation (ADC), and
 - ERP-Funds (“Austrian Support to Higher Education in Bosnia and Herzegovina 2008 – 2011”)
- Licenced by:
 - The Ministry of Science and Technology, Republic of Srpska Government



Mission of the Programme

- European University Association Council for Doctoral Education (EUA-CDE)

“Doctoral education is a major priority for European universities and for EUA. It forms the first phase of young researchers’ careers and is thus central to the drive to create a Europe of knowledge, as more researchers need to be trained than ever before if the ambitious objectives concerning enhanced research capacity, innovation and economic growth are to be met.” (Professor Georg Winckler - EUA President 2005-2009)

- Through the **Ph.D. in Information and Communication Technology** programme, the students are expected to
 - become researchers and experts in the field of ICT,
 - capable to give original contribution to the scientific knowledge,
 - to exemplify the highest standards in the field of ICT, and
 - to be of lasting value to the intellectual community.

Mission of the Programme (cont'd)

- There's a lack of the researchers and experts with Ph.D. degree in the field of ICT in Bosnia and Herzegovina, e.g.,
 - university professor positions,
 - consultants or research and development leaders in government departments, non-governmental organizations (NGOs), and in the private sector.
- The aim of this Ph.D. degree programme is to **strengthen the research potential** and to **overcome the gap between the existing state and actual needs**.

Structure of the Programme

- 3-years programme (6 semesters) assigned with 180 ECTS.
- During the first and second semester students are prepared for the final thesis through selected modules and courses
 - Courses - 48 ECTS,
 - Research - 12 ECTS.
- Within the first three semesters, a student has to choose a topic of dissertation and prepare the thesis proposal. The thesis proposal should be delivered up to 18 months after starting the programme.
- Last three semesters a student researches closely related to the final thesis and in the last semester completes the final thesis (dissertation). **Final thesis has to present original contribution to knowledge in the chosen research area.**

Structure of the Programme (cont'd)

Module	Course	Lecturer
Software Technologies	Model Driven Software Development	Prof. Dr. Wilhelm Schäfer
	Advanced Concepts in Databases	Prof. Dr Slavko Maric
	Selected Topics in Internet Programming	Dr. Zoran Djurić
	Scientific Computing	Prof. Dr. Momir Ćelić
Software Engineering	Multimedia Security Operating Systems	Prof. Dr. Ratko Dejanović
	Component-Based Software Engineering	Prof. Dr. Ivica Crnković
	Graph Theory	Prof. Dr. Eckhard Steffen
	Simulation	Dr. Chistoph Laroque
Multimedia	Advanced Multimedia Processing	Prof. Dr. Zdenka Babić
	Multimedia Information Retrieval and Management	Prof. Dr. Branimir Reljin
	Artificial Intelligence	Prof. Dr. Milorad Božić
	Robotic Vision	Prof. Dr. Petar Marić
Communications	Wireless Networks	Prof. Dr. Milan Šunjevarić
	Advanced Topics in Internet Technologies	Prof. Dr. Zoran Jovanović
	Cryptography and Computer Systems Security	Dr. Zoran Djurić
	Speech Processing and Transmission	Prof. Dr. Djemal Kolonić

Disputation

- After completion of the academic training and ...
- From the doctoral study law at the Faculty of Electrical Engineering, University of Banja Luka

“...Da bi završio studije...kandidat mora kao prvi autor imati objavljen (ili prihvaćen za štampu) bar jedan rad iz podričja teme doktorske disertacije u Časopisu sa faktorom uticaja (impact factor) jednakim ili većim od 0,500 i indeksiranom u bazama podataka Science Citation Index (SCI) ...”

Implementation Activities

- Preliminary Activities -

Back to 2009 ...

- Study visit at University of Paderborn (11 professors, 7 days)
- Access to academic databases
- Literature purchase
- Individual course preparing
- Reorganization of the e-learning www.el.etfbl.net study platform at Faculty of Electrical Engineering
- Promotion
- Discussion about legislative and open issues in double curricula organization – the **Ministry of Education and Culture** and the **Ministry of Science and Technology**
- Creation and adoption of rules

Implementation Activities

- Enrollment -

- **Prerequisites**
 - 300 ECTS
 - Minimum 12 ECTS from Mathematics
 - Minimum 180 ECTS from Electrical, Electronics and Information Engineering and/or Computer and Information Sciences
 - Fundamental subjects from the specific scientific fields, according to the main module
- 1st Generation of Students (2009/2010)
 - 17 candidates applied
 - 9 candidates passed the admission criteria
 - 7 enrolled students
- 2nd Generation of Students (2012/2013)
 - 6 candidates applied
 - 4 enrolled students

HERD/ICT NORBAS Project

- A double degree programme is formed with the **Norwegian University of Science and Technology, Faculty of Information Theory, Mathematics and Electrical Engineering**
- Supported by the **HERD/ICT NORBAS project** under reference 2011/1383 supported by the Norwegian Ministry of Foreign Affairs
- 2 students are (also) enrolled at the doctoral studies at the Norwegian University of Science and Technology
- In 2013, the Ph.D. study law from 2009 has been changed – **Student Mobility**
- In 2014, the Scientific Council of the FEE adopted the **Cooperation Agreement on doctoral studies between the University of Banja Luka and the Norwegian University of Science and Technology**



“Clues for Success

- Critical mass and critical diversity
- Recruitment, admission and status
- Supervision
- **Outcomes**
- Career development
- Credits
- Quality and accountability
- **Internationalization ...”**

(Salzburg II Recommendations, 2010)

Outcomes - Publication Records

- Enrolled Ph.D. students have published:
 - More than 30 scientific papers at the **regional conferences**
 - More than 30 scientific papers at the **international conferences**
 - About 10 papers in **international journals**
 - 4 from the SCI list
- **Significant progress**

Internationalization

- EUROWEB+ Erasmus project
- The FEE will serve as a host institution
 - An exchange Ph.D. student from the University of Balearic Islands, Spain will do the Ph.D. at the FEE
 - A professor from the same university will be hosted for a month at the FEE
 - » Lecture talks to the Ph.D. students

Gainings from the Ph.D. in ICT

- Internationalization and Europeanization of the academic offer regarding education
- Introduction of more research practice at universities in B&H
- Opening of the possibility for exchange modules/courses that will be automatically recognized for students of the partner institution
- The integration B&H universities into the EU education and research area
- Establishing joined research teams (Faculty of Electrical Engineering, University of Paderborn, University of Mälardalen, Norwegian University of Science and Technology) that will serve as base for research at doctoral studies

Experience gained through NORBAS

- Collaboration and discussions with Norwegian professors and international researchers from the Norwegian University of Science and Technology
- Collaboration with Kavli Institute for System Neuroscience, Trondheim, Norway
 - May Britt Moser and Edvard Moser



Thank you for your attention!

mladen.veletic@etfbl.net & mladen.veletic@iet.ntnu.no