Scientific Computing in Pilsen
Undergraduate and Graduate Course

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Scientific Computing Day

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Overview

Faculty of Applied Sciences
Department of Mathematics
Courses
Our graduates

Scientific Computing and Modeling + Mathematical Engineering
Basic course characteristics
Study plans

Supercomputing and Grids
New Technologies for Information Society
Faculty of Applied Sciences

- One of eight faculties at the University of West Bohemia in Pilsen
- Educational, science and research activity
- Science and engineering character
  - Mathematics
  - Physics
  - Computer Science and Engineering
  - Cybernetics
  - Mechanics
  - Geomatics
- 2nd in Czech technical faculties ranking 2009 (LN, 29.1.2009)
Department of Mathematics

- Probably the biggest department of mathematics in CZ (comparable in size with mathematical section of MFF UK in Prague)
- West Bohemia region is the first in number of citations per mathematician in 1994 – 2004 (source: ERGO, November 2006, TC AV CR)
- www.KMA.zcu.cz
  - Department of Discrete Mathematics
  - Department of Financial Mathematics and Applied Statistics
  - Department of Geometry
  - Department of Geomatics
  - Department of Mathematical Analysis
  - Department of Numerical Mathematics
Courses at the Faculty of Applied Sciences

**Undergraduate** (Bachelor)
- Applied and Engineering Physics
- Computer Systems
- Cybernetics and Control Engineering
- Financial Informatics and Statistics
- General Mathematics
- Geoinformatics (in preparation)
- Geomatics
- Information Technologies
- Mathematics and Financial Studies
- **Mathematics and Management**
- Mathematics for Natural Sciences
- **Scientific Computing and Modeling**
- Structural Mechanics

**Graduate** (Master) Studies
- Applied Physics and Physical Engineering
- Computer Engineering
  - Digital Systems
  - Distributed Systems and Networks
  - Intelligent Computer Systems
  - Computer Graphics and Systems
  - Software Engineering
- Cybernetics and Control Engineering
- Financial Informatics and Statistics
- Geomatics
- Mathematics
- **Mathematics and Management**
- **Mathematical Engineering**
- Mechanics
- Mathematics for Secondary School Teachers
Some of our graduates of our mathematical courses

Ing. Ondřej Beránek
financial director and vicechairman of the board in the company BOHEMIA SEKT, a.s.

Ing. Ctirad Hájek
financial director and vicechairman of the board in the company PLASTKOV AUTOMOTIVE a.s.

Ing. Tomáš Míka
head of the department of marketing research in the company GE Money

RNDr. Yana Vasilenko
business analyst in the company xITee, consultancy and development of IT solutions

Ing. Jaroslava Plasová
IT-controlling a SAP Business Intelligence in the company Energie AG Oberösterreich, Linz, Austria

Ing. Hana Kutáková
Scientific computing, design of prototypes and simulation of production processes in MECAS ESI, part of ESI Group
Scientific Computing + Mathematical Engineering

- **Scientific Computing and Modeling**
  - 3 years bachelor degree program (Bc., equivalent of BSc.)

- **Mathematical Engineering**
  - 2 years master degree program (Ing., equivalent of MSc.)

- Full-time as well as part-time (combined) form of studies

- Balanced combination of
  - applied mathematics and numerical methods
  - modelling of scientific and technological problems
  - information technologies and programming
  - engineering

- Emphasis on
  - superior background in mathematics and its applications
  - analytical and logic thinking
  - ability to solve problems and control processes of their solution
  - making decisions individually or in a team
Scientific Computing and Modeling (Bc.)

- Fundamentals of applied mathematics
- Numerical methods
- Mathematical modelling
- Fundamentals of computer science and information technologies
- Fundamentals of engineering and cybernetics
- Projects, Bachelor thesis

+ optional courses
Mathematical Engineering (Ing.)

- **Applied Mathematics**
  - mathematical modelling, dynamic optimization, advanced numerical methods and numerical analysis, . . .

- **Engineering**
  - structural and bio mechanics, nonlinear dynamics and chaos, optimization of production processes, computational fluid dynamics, material analysis, . . .

- **Projects, Diploma thesis**
- **English and second foreign language**
  - + optional courses
Erasmus Mobility

- Bilateral agreement between University of West Bohemia and Hochschule München (2008-2013)

- Subject area 11.0: Mathematics, Informatics

- Upto 35/33 (from CZ/DE) students per year (total sum 350/330 student months)!
  - 20/20 undergraduates
  - 15/10 graduates
  - 0/3 doctorate

- Also teaching staff and staff training mobility

- List of courses taught in English available at

  www.KMA.zcu.cz/mobility
MetaCentre

- Czech national digital grid e-infrastructure
- covers majority of activities concerning Grids, super-, cluster- and grid computing and/or high performance/throughput computing
- provides users with an easy access to resources, hiding the complexity of the environment
- on 11.3.2009 total 1365 CPUs (cores), 400 TB storage
- application areas: computational chemistry, material and structural simulations, flow simulations, speech recognition and generation, physical geodesy, ecological modelling, video processing, data mining, analysis of medical images, ...
NTIS - New Technologies for Information Society

- **Research and Development for Innovations, priority axis 1**
  - **European Centre of Excellence**

- **Main goal:** build a new centre of excellence with a unique infrastructure specialized to research, development, innovation and education in the sections:
  - Information and communication technologies (ICT)
  - Material research for information society

"increase of employment, productivity and higher education in the region"

- **Required grant:** cca 45 milions EUR
- **Realization:** 2010 - 2015
- **Status of preparation:** processed a urban study together with the ground plan, project preparation is being completed
NTIS - New Technologies for Information Society

- **Technical specialization**
  - computer science, artificial intelligence, simulation, process of visual information, bioinformatics
  - cybernetics and systems theory, automatization, control, robotics, biocybernetics, speech technologies
  - computational mechanics, biomechanics
  - physics of thin films of materials, nanotechnologies
  - analytical and discrete mathematics, mathematics and management, geomatics
  - scientific computing

- **Partial goals of the project**
  - intensify interdisciplinary synergies to gain the key competences for information society of the 21st century
  - consolidate the so-called knowledge among research, development and education of talented and postgraduate students
  - enable an easy application of information technologies to the public user community
NTIS - New Technologies for Information Society

- Assumptions of the Faculty of Applied Sciences to fulfill key indicators and purposes of RDP (data y. 2007)
  - 70 projects in CR and EU amount in total over 4 millions EUR
  - over 450 articles in technical journals with international citation response
  - cooperation with cca 100 research teams at universities and research institutions all over the world
  - the organization of 10 international scientific conferences
  - over 200 Ph.D. students, 28 Ph.D. graduates

- Expected contribution of the project
  - existence of centre of excellence - consolidation of technical and natural sciences in the region
  - increase of quality and number of R-D outcomes
  - powerful synergy effect with scientific and commercial institutions in the region and EU
  - cca 120 new qualified jobs
  - transfer of R-D outcomes to industry
  - reinforcement of the competitive strength in the region
NTIS - Partnership and synergy

We expect a strong relationships with other R-D operational programmes, i.e we are ready and competent for **cross-border cooperation**

▶ business and innovations - use ICT technologies in business

▶ education for competitive strength - expansion of manpower for research, development and innovation activities

▶ implementing ICT in public services - renovation of regional public services, e-Government

Already exists cooperation with companies Volkswagen, Škoda Auto, Škoda Nuclear Engineering, ZAT, ÚJV Řež, CEPS, ČEZ, Czech TV, CISCO, Microsoft, Nuclear powerstation Temelín, ABB, Fincom-Materna Communications, Novasoft, ...
Scientific Computing Day

- "Jeder kann Mathematik begreifen"

- In Pilsen haben wir nicht nur das beste Bier der Welt (welches das Begreifen der Mathematik in einer besonderen Art beeinflusst), sondern auch
  - Scientific Computing und Grids (MetaCentre).

- Die Tschechen gehen jetzt sogar einen Schritt weiter in Richtung Europäisches Zentrum der Exzellenz
  - New Technologies for Information Society