Environmental Informatics

Doctoral College
Environmental Informatics

Prof. Schahram Dustdar
Head of the Doctoral College

Kick-Off Event
12th March 2013
http://ei.infosys.tuwien.ac.at
Agenda

• Introduction
  – Faculty of Informatics
  – Related Faculties/groups

• Introduction to the Doctoral College
  Environmental Informatics
  – EI research/teaching and TU Vienna positions
  – Mission and goals
  – Faculty staff
  – Students
  – Curriculum
RESEARCH FOCUS POINTS

- Computational Science and Engineering
- Energy and Environment
- Information and Communication Technology
- Materials and Matter
- Quantum Physics and Quantum Technologies
FACULTIES

- Architecture and Planning
- Civil Engineering
- Electrical Engineering and Information Technology
- Informatics
- Mathematics and Geoinformation
- Mechanical and Industrial Engineering
- Physics
- Technical Chemistry
Faculty of Informatics: Institutes and Research Groups

- Institute of Computer Engineering (E182)
  - Real Time Systems
  - Embedded Computing Systems

- Institute of Computer Aided Automation (E183)
  - Automation Systems
  - Computer Vision

- Institute of Information Systems (E184)
  - Distributed Systems
  - Database and Artificial Intelligence
  - Knowledge Based Systems
  - Formal Methods in Systems Engineering
  - Parallel Computing

- Institute of Computer Languages (E185)
  - Compilers and Languages
  - Theory and Logic

- Institute of Computer Graphics and Algorithms (E186)
  - Algorithms and Data Structures
  - Computer Graphics
  - Pattern Recognition and Image Processing

- Institute of Design and Assessment of Technology (E187)
  - Multidisciplinary Design
  - Human Computer Interaction

- Institute of Software Technology and Interactive Systems (E188)
  - Information & Software Engineering
  - Interactive Media Systems
  - Business Informatics
  - E-Commerce
Faculty of Informatics: Primary Research Areas

Future Internet

Media Informatics and Visual Computing

Business Informatics

Computational Intelligence

Distributed and Parallel Systems

Computer Engineering

Future Internet

Content-Based Retrieval

Human-Computer Interaction

Socially Embedded Technologies

Cultural Heritage and Edutainment

Dependable Networked Embedded Systems

Fault-Tolerant Distributed Real-Time Systems

Time-Triggered Real-Time Systems

Dependable Systems-on-Chip

Model-Based Design, Validation, and Verification

Automation Systems

Internet Engineering

Software Architectures

DPS Design Paradigms

Parallel Computing Programming Models and Environments

Parallel Algorithms, Complexity, and Optimization

Foundations of Information Systems

Computational Logic and Automatic Deduction

Logic, Specification, and Knowledge Representation

Hardware and Software Verification (CAV)

Semantic Web and Intelligent Agents

Algorithms, Complexity, and Optimization

Natural Computing

Business Engineering

Web Science and Engineering

Model-Driven Engineering

Quality Software Engineering

Business Intelligence

Semantic Technologies and Knowledge Management

Electronic/Mobile Commerce, E-Government

Computer Graphics

Computer Vision

Visualization/Interactive Visual Analysis

Virtual/Augmented/Mixed Reality

Computer Engineering

Internet Engineering

Software Architectures

DPS Design Paradigms

Parallel Computing Programming Models and Environments

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Semantic Web and Intelligent Agents

Algorithms, Complexity, and Optimization

Natural Computing

FACULTY OF INFORMATICS
Faculty of Informatics: 
Teaching

- PROGRAMS
  - 5 Bachelor programs
  - 9 Master programs (three in English)
    - Vienna PhD School of Informatics
    - Doctoral Colleges

- STUDENTS (winter term 2012/13)
  - 33,645 Students at TU Vienna
  - 8,122 Students at the Faculty of Informatics
  - 3,391 Beginners at TU Vienna (bachelor level)
  - 624 Beginners at Faculty of Informatics (bachelor level)

Source: https://tiss.tuwien.ac.at/statistik/lehre/studien
Faculty of Informatics: Doctoral and PhD programs

Duration 6 terms

1. Technical Sciences (Dr.techn.)
2. Social Sciences and Economics (Dr.rer.soc.oec.)
3. Natural Sciences (Dr.rer.nat.)
4. Vienna PhD School of Informatics
5. Doctoral Colleges
   - Computational Perception
   - Mathematical Logic in Computer Science
   - Environmental Informatics
   - Adaptive Distributed Systems
Additional Involved Faculties

- Architecture and Planning
  - Institute of Architectural Sciences
    - Department of Building Physics and Building Ecology,
- Electrical Engineering and Information Technology
  - Institute of Energy Systems and Electrical Drives
    - Group Energy Systems
    - Group Energy Economics
- Mathematics and Geoinformation
  - Institute of Geoinformation and Cartography
    - Group Geoinformation
EI - World-wide Research and Education Initiatives

- Basic and applied research
- Awareness and Funding is increasing
- High demand from industries

Keys to Solution: domain expertise + ICT!
Environmental Informatics doctoral college establishes a university-wide integrated research and education program.
Key Faculty Members

Andrew Frank [E127]
- Geoinformation and Cartography

Wolfgang Gawlik [E370]
- Energy Systems and Electrical Drives

Ardeshir Mahdavi [E259]
- Architectural Sciences
- Building Physics, Building Ecology

Nebojsa Nakicenovic [E370]
- Energy Systems and Electrical Drives
- Energy Evolution and Climate Change

Schahram Dustdar [E184]
- Distributed Systems
- Service-, and Cloud Computing

Wolfgang Kastner [E183]
- Computer Aided Automation
- Distributed Automation, Smart Buildings/Cities

Silvia Miksch
- Software Technology and Interactive Systems
- Information Visualization and Analytics

Günther Raidl
- Computer Graphics and Algorithms
- Algorithms, Combinatorial Optimization

A Min Tjoa
- Software Technology and Interactive Systems
- Data Mining, Semantic Web

Jesper Larsson Träff
- Information Systems
- High Performance Computing, Parallel Computing
Doctoral College – Mission and goals

Environmental solutions

1. Environmental Research
2. Resource Management
3. Green Business
4. Smart Solutions

Enabling technologies

A. Information Semantics, Management, and Integration
B. Visual Analytics
C. Algorithmic Modeling, Simulation, Optimization
D. Large-scale data- and compute-intensive systems
E. Governance and Decision Support
Doctoral College – Mission and goals

T1: Platform-as-a-Service for Environmental Informatics

T3: Adaptive Micro Grid Control and Protection

T9: Exploiting Linked Open Data in Environmental Informatics

T5: Coupled Multi-level Models for Performance Assessment of Built Environments

T6: Exploring and Analyzing Environmental Data with Visual Analytics Methods

T2: Ontologies to Model the Construction and the Use Processes in the Built Environment

T10: Parallel Computing for Energy Efficiency

T7: Decarbonization and Efficiency Revolution

T4: Information Modeling and Ontologies

T8: Optimization Issues in Public Bike Sharing Systems
## Interdisciplinary Topic Map

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<thead>
<tr>
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<th>Enviromental Research</th>
<th>Resource Management</th>
<th>Green Business</th>
<th>Smart Solutions</th>
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<tr>
<td>A</td>
<td>Information semantics, management and integration</td>
<td>T4, T9</td>
<td>T2, T4, T9</td>
<td>T2, T4, T9</td>
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<td>B</td>
<td>Visual analytics</td>
<td>T6</td>
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<td>C</td>
<td>Algorithmic modeling, simulation, optimization</td>
<td>T5, T8</td>
<td>T3, T8, T10</td>
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<td>D</td>
<td>Large-scale data and compute-intensive systems</td>
<td>T4, T5</td>
<td>T1</td>
<td>T1, T4</td>
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<td>E</td>
<td>Governance and decision support</td>
<td>T5, T7</td>
<td>T3, T7, T8</td>
<td>T3, T5, T7, T8</td>
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## Doctoral College – 10 Students

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<tr>
<th>Name</th>
<th>Nationality</th>
<th>Designated PhD advisor</th>
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<tr>
<td>N.N</td>
<td>N.N.</td>
<td>Schahram Dustdar</td>
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<td>N.N</td>
<td>N.N.</td>
<td>Andreas Frank</td>
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<tr>
<td>Yi GUO</td>
<td>Chinese</td>
<td>Wolfgang Gawlik</td>
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<tr>
<td>Andreas FERNBACH</td>
<td>Austrian</td>
<td>Wolfgang Kastner</td>
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<tr>
<td>Stefan GLAWISCHNIG</td>
<td>Austrian</td>
<td>Ardeshir Mahdavi</td>
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<td>Markus BÖGL</td>
<td>Austrian</td>
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<td>Christian KLOIMÜLLNER</td>
<td>Austrian</td>
<td>Günther Raidl</td>
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Doctoral students will have to select courses in the amount of 18 ECTS points.

Structures of selected courses

- **Domain-specific Courses**
  - Building Science
  - Energy Economics

- **Enabling Technologies**
  - Computational Intelligence
  - Large-scale Computing

- **Foundation Courses**
  - Algorithms & Optimization
  - Information Visualization

- **Generic Courses**
  - Research and Career Planning
  - Innovation
  - Philosophy of Science

18 ECTS courses are mandatory, starting from the beginning of Year 1
Doctoral College – Curriculum

Reports

- **Optional 3 Month Report:** Initial survey of the research area
- **Optional 6 Month Report:** Comprehensive and critical survey
- **Mandatory PhD Proposal – Month 12**
- **Mandatory PhD Poster – Month 12**

International Research Community Participations

- **Conferences and Workshops 'Active':** Mandatory, starting from Y2
- **Conferences and Workshops 'Passive':** Optional
- **Summer School:** Optional
- **Doctoral Consortium:** Optional, starting from Y2
- **Visiting Researcher / Engineering Internship:** Optional, starting from Y2
- **Visiting Professors:** Optional

FACULTY OF INFORMATICS
Other activities

Scientific Publications: Peer-review publications are mandatory, starting from Y2

Teaching: Mandatory, starting from Y2

Supervision and Joint Activities: mandatory, starting from Y2

Transferable Skills: optional, including Communication Skills, Research methods, and Project Planning and Management Skills

Career Development: optional, beginning of Y2
Doctoral College – Curriculum

- Peer-reviewed Publications
- Courses
- Other activities

PhD dissertation submission – at the end of Y3

PhD Defense
(i) Mandatory courses

The following three courses **should be attended by all students** of the doctoral college.

- 195.024 Innovation
- 195.020 Philosophy of Science
- 195.013 Research and Career Planning for Doctoral Students

(ii) Courses to be selected in coordination with the thesis advisor and the Deans of Study Affairs

See [http://ei.infosys.tuwien.ac.at/courselist.html](http://ei.infosys.tuwien.ac.at/courselist.html) for the list of possible courses
Thanks for your attention

Questions?