Institute of Construction Management
University of Stuttgart

Univ.-Prof. Dr.-Ing. Fritz Berner
Ordinarius

Global Leadership Forum for Construction Engineering and Management Programs

May 19-20, 2012
Stuttgart and the University
Popular institutions
University of Stuttgart – History

1829 Foundation of the royal secondary and business school of Stuttgart by King Wilhelm I. of Württemberg ("Combined secondary and business school"). First school building: A former military gazebo near the city centre.

1862 The School is directly supervised by the ministry of education. It is given a self-administration containing an annually elected vice chancellor and several faculties with deans.

1870 Introduction of Diploma-Examinations

1890 Title “Technical High-school“

1900 Right to award doctoral degrees
University of Stuttgart – History

1950  New buildings for several institutes were constructed, among the council buildings K I and K II.

1957  The second campus is built in Stuttgart-Vaihingen.
      Today more than two thirds of all institutes are settled there

1964  Foundation of the Institute of Construction Management

1967  New Title “University of Stuttgart“

1974  Over 10.000 students

1988  Over 20.000 students

2000  Setup of a university council

2011  About 23.000 students (including about 5.000 foreign students)
Characters (building sector)

Theodor Fischer  
Originator of the Stuttgart Architecture School

Emil Mörsch  
Originator of the “Theory of Reinforcing Steel Constructions“

Otto Graf  
Material and construction element testing

Paul Bonatz  
Architecture and urban development teaching

Richard Döcker  
Construction supervisor of the “Weißenhof“-settlement

Fritz Leonhardt  
New building methods for bridges and television towers

Theodor Fischer  1862 – 1938
Emil Mörsch  1872 – 1950
Otto Graf  1881 – 1956
Paul Bonatz  1877 – 1956
Richard Döcker  1894 – 1968
Fritz Leonhardt  1909 – 1999
# Faculties of the University of Stuttgart

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty 1</td>
<td>Architecture and Urban Planning</td>
</tr>
<tr>
<td>Faculty 2</td>
<td>Civil- and Environmental Engineering</td>
</tr>
<tr>
<td>Faculty 3</td>
<td>Chemistry</td>
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<tr>
<td>Faculty 4</td>
<td>Energy Technology, Process Engineering and Biological Engineering</td>
</tr>
<tr>
<td>Faculty 5</td>
<td>Computer Science, Electrical Engineering and Information Technology</td>
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<tr>
<td>Faculty 6</td>
<td>Aerospace Engineering and Geodesy</td>
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<tr>
<td>Faculty 7</td>
<td>Engineering Design, Production Engineering and Automotive Engineering</td>
</tr>
<tr>
<td>Faculty 8</td>
<td>Mathematics and Physics</td>
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<tr>
<td>Faculty 9</td>
<td>Humanities</td>
</tr>
<tr>
<td>Faculty 10</td>
<td>Management, Economics and Social Sciences</td>
</tr>
</tbody>
</table>
Institute of Construction Management
Direction

Prof. Dr.-Ing. Fritz Berner
Director

Dr.-Ing. Wolfgang Paul
Deputy Director
Academic members of staff

Dipl.-Ing. S. Klamert
Dipl.-Ing. Chr. Berthold
Dipl.-Ing. V. Kochkine
Dipl.-Ing. (FH) F. Viehmann M.Sc.
Dipl.-Wirt.-Ing. K. Thurman
Dipl.-Wirt.-Ing. S. Lange
Dipl.-Wirt.-Ing. M. Hermes
Institute of Construction Management – History

- One out of more than 20 institutes in the faculty of Civil & Environmental Engineering at the University of Stuttgart

- Established in 1964

- Aims:
  - Science and research in all areas of construction economy and transfer them into the education of civil engineers
  - Close relationship between research and teaching
  - Strong links to the construction industry
Areas of research

- Management Organisation
- Financial Analysis
- Real Estate Engineering and Management
- Optimisation of Work and Production
- IT in Construction Management
- Controlling
- Quality Improvement within Turnkey Structural Engineering
- Knowledge Management
- Facilities Management
- Public Private Partnership
Study courses

The Institute of Construction Management is involved in the following study courses:

- Real Estate Engineering and Management
- Civil Engineering
- Business Administration (technical oriented)
- Technical Education
Teaching:
Real Estate Engineering and Management
Professions around real estate

<table>
<thead>
<tr>
<th>Profession</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect</td>
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<tr>
<td>Civil Engineer</td>
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<tr>
<td>Building Services Engineer</td>
<td></td>
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<tr>
<td>Economist</td>
<td></td>
</tr>
<tr>
<td>Lawyer</td>
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</tr>
</tbody>
</table>

Interdisciplinary approach of real estate
Aims of study course

- To comprise all aspects concerning real estate
- The educational goal is not only the planning and construction of buildings, but also to control all life phases of real estate and to organise them according to economical questions and demands

The graduated real estate specialist will be prepared to face all problems concerning the lifecycle of real estate

⇒ Integral, interdisciplinary view of real estates
Due to its composition the different lectures of the course of studies are assigned to different departments of the University of Stuttgart.
Study course organisation

- Bachelor (180 ECTS) - Start WT 2008/09
- Master (120 ECTS) - Start WT 2011/12
Study Macrostructure

1st to 6th Sem.

Bachelor (180 ECTS)
- Profession Modules (150 ECTS)
- Key Skills (18 ECTS)
- Bachelor Thesis (12 ECTS)

Bachelor of Science (profession capability)

7th to 10th Sem.

Master (120 ECTS)
- In-depth block (54 ECTS)
- Specialization block (36 ECTS)
- Master Thesis (30 ECTS)

Graduate degree: Master of Science (professional qualification)
Real Estate Engineering and Management

- Bachelor -

Start: Winter term 2008/09
Split-up of the contents – „3 columns-principle“

Engineering (of Real Estate)
Selected chapters of Construction Engineering, Architecture and Urban Planning, Building Services Engineering and Real Estate Engineering
ca. 60 %

Real Estate Management / Business Administration
ca. 30 %

Law
ca. 10 %
## Profession Modules Bachelor

### Profession Modules (150 ECTS / 83%)

#### Basic Modules
( required modules 36 ECTS / 20%)
- Mathematical Basics
- Engineering Basics

#### Major Modules
( required modules 87 ECTS / 48%)
- Basics of Architecture and Urban Planning
- Basics in Business Administration
- Basics in Construction Work
- Basics in Building Services Engineering
- Basics in Real Estate Engineering and Economics

#### Complementary Modules
( required modules 27 ECTS / 15%)
Deepening the Major Modules. The students choose from a large amount of modules e.g.
- structural engineering
- Business Administration
- Construction Work
- Building Services Engineering

### Bachelor Thesis (12 ECTS / 7 %)
- Academic assignment with 12 ECTS (360 hours of work) about a Major Subject Topic
- Written science-based assignment of ca. 70-80 pages
### Structure of the Bachelor Course „Real Estate Engineering and Economics“

<table>
<thead>
<tr>
<th>1. Term (WT)</th>
<th>2. Term (ST)</th>
<th>3. Term (WT)</th>
<th>4. Term (ST)</th>
<th>5. Term (WT)</th>
<th>6. Term (ST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Mathematics I + II</td>
<td>Construction Management I</td>
<td>Construction Management II</td>
<td>Building Engineering</td>
<td>Systems and Methods of Real Estate and Permits Assessment</td>
<td></td>
</tr>
<tr>
<td>Building Physics and Structural Engineering</td>
<td>Materials I</td>
<td></td>
<td></td>
<td>Legal Influences on the Development Phases of Building Projects</td>
<td>Facility Management</td>
</tr>
<tr>
<td>Fundamentals in Economics</td>
<td>Basics in Illustration and Construction</td>
<td>Key skills: Subjekt Comprehensive</td>
<td>Collection and Management of Survey Data and Statistics</td>
<td>Real Estate Marketing</td>
<td>Elective Modules</td>
</tr>
<tr>
<td>The History of Development of Real Estate</td>
<td>Elective Modules</td>
<td>Elective Modules</td>
<td>Elective Modules</td>
<td>Bachelor Thesis</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- Modules and their credit points (cp)
- 30h workload = 1 CP

**Basic Modules**: 36 CP
**Complementary Modules**: 27 CP
**Major Modules**: 87 CP
**Bachelor Thesis**: 12 CP
**Key skills**: Subjekt affine: 12 CP, Subjekt Comprehensive: 6 CP

**Annotation**: Elective modules and key skills can be attend in other semesters as pictured.
Real Estate Engineering and Management - Master -
Start: Winter term 2011/12
## Profession Modules Master

### Profession Modules (90 ECTS / 75%)

#### In-depth Modules
(core Modules 54 ECTS / 45%)

**Categories:**
- Real Estate Engineering
- Real Estate Management
- Real Estate Laws

#### Specialization Modules
(Elective Curses 36 ECTS / 30%)

**Categories:**
- Real Estate and Project Management
- Structural Engineering
- Building Physik
- Building Services Engineering
- Materials
- Traffic Technology and Road Construction
- Architecture and Construction
- Regional Planning and Urban Development
- Business Administration

### Master Thesis (30 ECTS / 25%)

Academic assignment with 30 ECTS (900 hours of work) referring to a topic of a deepened or specialized module.
## Structure of the Master Course “Real Estate Engineering and Economics”

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Term (WS)</td>
<td>Selected Issues of Construction Process Management</td>
<td>6 CP</td>
</tr>
<tr>
<td></td>
<td>Fiscal View of Real Estate</td>
<td>3 CP</td>
</tr>
<tr>
<td></td>
<td>Legal Ascendancies of Construction Projects in Planning, Placing and Realisation Phase</td>
<td>6 CP</td>
</tr>
<tr>
<td>2. Term (SS)</td>
<td>Facade and Building Envelope</td>
<td>6 CP</td>
</tr>
<tr>
<td></td>
<td>Real Estate Planning and Development</td>
<td>9 CP</td>
</tr>
<tr>
<td></td>
<td>International Valuation of Real Estates</td>
<td>3 CP</td>
</tr>
<tr>
<td></td>
<td>Portfolio Management</td>
<td>3 CP</td>
</tr>
<tr>
<td>3. Term (WS)</td>
<td>Real Estate Financing</td>
<td>3 CP</td>
</tr>
<tr>
<td></td>
<td>Building Technology, Fire Protection and Finishing</td>
<td>6 CP</td>
</tr>
<tr>
<td></td>
<td>Selected Issues of Project Management II</td>
<td>3 CP</td>
</tr>
<tr>
<td>4. Term (SS)</td>
<td>Elective Courses</td>
<td>6 CP</td>
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<tr>
<td></td>
<td>Master Thesis</td>
<td>24 CP</td>
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<td></td>
<td>Elective Courses</td>
<td>15 CP</td>
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<td>Elective Courses</td>
<td>6 CP</td>
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<tr>
<td></td>
<td>Elective Courses</td>
<td>15 CP</td>
</tr>
</tbody>
</table>

**Legend:** Modules and their credit points (CP)

**In-depth module:**
- Core courses: 54 CP

**Specialization modules:**
- Elective courses: 42 CP

**Master Thesis:** 24 CP

**Annotation:** Elective modules and key skills can be attended in other semesters as pictured.
History of total number of students

- Real Estate
- Civil Eng.
- Environmental Eng.
Research Projects
– Integration of additional Criteria into the Rating System for Sustainable Construction –
Integration of additional Criteria into the Rating System for Sustainable Construction

- Sustainability is an important element of the German politics since several years.

- The guideline Sustainable Construction of the Federal Ministry of Transport, Building and Urban Development (BMVBS) is used as integral quantitative valuation method for new constructions of office and administration buildings.

- By the development of the rating system several criteria had to be neglected at first and are now available because of additional research projects by the Institute for Construction Management:
  - Backup ability, user friendliness and the quality of the technical building equipment
  - Respirable dust emission of heating systems
  - The resistance to natural threats
Research Projects
– Early detection of insolvencies within building companies –
Early detection of insolvencies within building companies

- How can an imminent risk of insolvency be anticipated as early as possible?
- Comparison of insolvent and non-insolvent consolidated construction companies:
  - Philipp Holzmann, 2002
  - Walter Bau, 2005
  - Hochtief
  - Bilfinger Berger

- Period under consideration: 10 years
- The balance sheets released to the public as part of the annual reports were analyzed.
Effect of financial encroachments

<table>
<thead>
<tr>
<th>Year</th>
<th>TEUR</th>
<th>insolvent</th>
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<tbody>
<tr>
<td>1991</td>
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<td>2000</td>
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</tbody>
</table>

Equity: dark green
Debt: light green
Special qualified forward-locking indicators

- Indicators for special qualification
  - Time of occurrence two years before insolvency
    (evaluated degree = 0.31)
  - Degree of identifiability 25 %
    (evaluated degree = 0.25)

- Special qualified indicators
  - $F_l^{(2)}$: equity
  - $F_l^{(1)}$: current assets
  - $F_l^{(4)}$: leverage ratio
  - $F_l^{(9)}$: accruals
  - $F_l^{(11)}$: liquidity ratio
  - $F_l^{(7.1)}$: equity-to-fixed-assets ratio I
  - $F_l^{(10)}$: long term liabilities
Real Estate Engineering and Management

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Study Course Director

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THANK YOU FOR YOUR ATTENTION.