Presentation of the master specialization: Materials and Mechanics

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Institute for Building Materials, ETH Zurich

ifb.ethz.ch/education
# IfB Specialization in Materials and Mechanics

## Major in Materials and Mechanics (from HS 2020 on)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Technology</th>
<th>Research and Development</th>
<th>Modelling and Simulation</th>
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</thead>
<tbody>
<tr>
<td>1st semester (HS)</td>
<td>Advanced Building Materials</td>
<td>Flatt, Burgert 2V; 4KP</td>
<td>Numerical Mechanics of Materials</td>
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<td></td>
<td>Concrete Technology</td>
<td>Constandopoulos, Bäuml, Martinolina 2G; 2KP</td>
<td>Mechanics of Composite Materials</td>
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<td></td>
<td>Moisture Transport in Porous Media</td>
<td>Carmellet, Kubilay, Zhou 2G; 3KP</td>
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<td>Σ17KP</td>
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<tr>
<td>2nd semester (FS)</td>
<td>Concrete Materials Science</td>
<td>Flatt, Wangler 2G; 4KP</td>
<td>Scientific Programming</td>
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<td>Wood Physics &amp; Wood Materials</td>
<td>Burgert, Zimmermann 2G; 3KP</td>
<td>Method of Finite Elements 1</td>
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<td>NDT &amp; Health Monitoring</td>
<td>Burgert, Angst 2G; 3KP</td>
<td>Building Materials and Sustainability</td>
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<td></td>
<td>MaP Distinguished Lecture series on Additive Manufacturing</td>
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<td>Schieber, Meboldt, Studart 2S; 1KP</td>
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<td>Σ22KP</td>
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<tr>
<td>3rd semester (HS)</td>
<td>Structures of Wood and Function</td>
<td>Burgert, Zürcher 2G; 3KP</td>
<td>Method of Finite Elements 2</td>
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<td>Shrinkage and Cracking of Concrete</td>
<td>Lura, Wyrykowski 2G; 3KP</td>
<td>Particle Methods in Engineering**</td>
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<td>Durability and Maintenance of RC Structures</td>
<td>Angst, Eisener 2V; 4KP</td>
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<td>Science and Engn of Glass and Natural Stone in Construction**</td>
<td>Wittel, Wangler 2G; 3KP</td>
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<td>Fundamentals of Wood Elaboration and Woodmachining</td>
<td>Burgert, Schubert 2G; 3KP</td>
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<td>Σ19KP</td>
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24 KP required in specialization

**mandatory courses**

**biannualy**
Alumni Profiles:

Technology

• Material design
  • Concrete formulation (tailor design)
  • Material testing
  • Knowing who to ask, understanding answers, deciding, getting it done

• Durability
  • On site diagnosis
  • On site monitoring
  • Prescription

• Job examples
  • Technical marketing
  • Technical gourou (in large companies)
  • Independent expert/consultant

A. Bertoncini; dipl. Bauing. ETH
Technischer Berater bei TFB AG (Technische Forschung und Beratung für Zement und Beton) Wildegg, Ag
Alumni Profiles:

Research and Development

- Research
  - Understanding what happens
  - Defining what to do
  - Experimental focus
- Development
  - Innovation
  - Material testing
- Job examples
  - R&D labs of material producers (ex: Holcim, Sika, Trösch)
  - Technical marketing
  - University or institutional research
  - Spin offs??

Philippe Jost, Dipl. Bauing. ETH
Senior Vice President Business Unit Concrete and Head New Market Development of SIKA Services AG

April 14th 2018, RJ Flatt

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Alumni Profiles:

Modeling and simulation

- Comprehension
  - Physical phenomena (not accessible by experimentation)
  - Coupled phenomena
  - Team work with experimentalists
- Prediction
  - Durability involving coupled phenomena
  - Long term stability (ex: nuclear power plants)
- Job examples
  - University or institutional research
  - Large engineering bureau
  - Specialized engineering service
  - Spin offs??

dipl. bauing. ETHZ Andrea Pedretti
Entreprises: Airlight Ltd / Airlightenergy
Chief Technology Officer / structural design

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Good reasons to choose M&Ms

1. It’s fun
2. You’re interested in broadening your scientific culture in a *multidisciplinary* context
Diverse expertise
Good reasons to choose M&Ms

1. It’s fun
2. You’re interested in broadening your scientific culture in a multidisciplinary context
3. You believe materials are a vector for innovation
Innosuisse project: Large-scale wood bilayers

- 0.5 mm adhesive: Isotropic
- Active layer: \(X, Y, Z = R, T, L\)
- Passive layer: \(X, Y, Z = L, T, R + \) rotation by \(\varphi\)

Self-shaped

+ Self-shaped

+ Locking layer (cold bent)
Good reasons to choose M&Ms

1. It’s fun
2. You’re interested in broadening your scientific culture in a multidisciplinary context
3. You believe materials are a vector for innovation
4. You want to become the greatest civil engineer ever
5. You want to save the world
6. You want to be able to judge tomorrow’s materials
IfB Specialization in Materials and Mechanics

Swiss wood solutions

A Technology Developing and Solution Providing Company for …

… Wood Materials and Applications

Sonowood

Fire retardant wood

Translucent wood
Convinced about M&M’s?