The specialization Software Engineering

- Prof. Dr.-Ing. Peter Liggesmeyer *, apl-Prof. Dr.-Ing. Mario Trapp **: Software Engineering: Dependability
- Prof. Dr. Ralf Hinze, Programming Languages
- Prof. Dr. Arnd Poetzsch-Heffter***: Software Technology; currently being offered by Dr. Annette Bieniusa
- Dr. Annette Bieniusa
- Many lecturers from Fraunhofer IESE

* Executive director of Fraunhofer IESE
** Executive director of Fraunhofer ESK, Munich
*** Vice president for research at TUK
Why Software Engineering?

- Software Engineering provides many facets => Techniques, methods, processes, management
- Software Engineering influences every domain (e.g., banking, insurance companies, automotive, aerospace, medical, automation, ....)
- Software Engineering is a discipline in computer science, that always needed more workforce than available (more open positions than applicants)
- Software Engineering is international
- The market for Software Engineers ist still growing => good career opportunities
Future systems: Smart Ecosystems

Emergent Software
IS-Driven

Cyber-Physical-Systems
ES-Driven

Data Analytics
Software has to have specific properties (e.g., safety, availability) => Quality assurance: **Software Engineering: Dependability**

Definition and processing of software => Models, techniques and tools: **Software Technology**

Writing software requires appropriate programming languages => **Programming Languages**
Software Engineering: Dependability  
(Prof. Liggesmeyer)

- Software Engineering for technical systems (Cyber-physical systems)
- Safety, reliability, availability

Research topic: Development and quality assurance techniques for safety-critical systems

=> Assessment and reduction of risks
Research topics

- **Object-oriented and component-based programming**
  - Component models and their integration
  - Parallel and distributed programming

- **Modeling and generation of software**
  - Software modeling on higher abstraction levels
  - Domain specific models
  - Generation of efficient code based on models

- **Specification and verification** of software properties
  - Specification and verification languages and tools
  - Dynamic property checking
Programming Languages
(Prof. Hinze)

Research topics

• Functional and generic programming
• Semantics of programming languages, Category theory
• Systematic algorithm design (Algebra of Programming)
• Persistent data structures

Our long-term goal is to develop theory, languages, and tools that simplify the construction of reliable software systems.
The specialization Software Engineering
Prof. Dr.-Ing. Liggesmeyer, Prof. Dr. Poetzsch-Heffter, Prof. Dr. Hinze, Dr. Bieniusa and Lectures from Fraunhofer IESE

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<tr>
<th>Software Engineering: Dependability (seda)</th>
<th>Fraunhofer IESE</th>
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<tr>
<td><strong>Kontakt:</strong> C. Frey, <a href="mailto:frey@informatik.uni-kl.de">frey@informatik.uni-kl.de</a>, <a href="http://seda.cs.uni-kl.de">http://seda.cs.uni-kl.de</a></td>
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- Modellierung, B, 2V+1Ü, SS (D), Liggesmeyer
- Foundations of Software Engineering (FSE), B/M, 2V+1Ü, SS (E), Lig.
- Safety and Reliability of Embedded Systems (SRES), B/M, 2V+1Ü, WS (E), Lig.
- Software Quality Assurance (SQA), M, 2V+1Ü, every 2. WS (E), Liggesmeyer
- Quality Management of Software and Systems (QMSS), M, 2V+1Ü, every 2. WS (E), Liggesmeyer

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<th>Programming Languages (AGPL) / Software Technology (softech)</th>
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<td><strong>Kontakt:</strong> J. Stengel, <a href="mailto:stengel@informatik.uni-kl.de">stengel@informatik.uni-kl.de</a>, <a href="https://pl.cs.uni-kl.de">https://pl.cs.uni-kl.de</a></td>
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- Grundlagen der Programmierung, B, 4V+4Ü, WS (D), Hinze
- Programmierpraktikum, B, 2P, SS (D), Hinze
- Training für Programmierwettbewerbe, B, 2S, SS(D) unregelmäßig, Bieniusa
- Funktionale Programmierung, M, 4V+2Ü, SS (D, ggf. E), Hinze
- Compiler and Language Processing Tools, 3V + 3Ü, WS (E), Bieniusa
- Programming Distributed Systems, 3V+3Ü, SS (E), Bieniusa
- Replication and Consistency, 2V+1S, WS (E), Bieniusa
- Programmieren in C, B(Hörer anderer FBs), 2V+2Ü, SS (D), Bieniusa
- Programmieren in Anwendungen, B(Hörer anderer FBs), 2V + 2Ü, SS (D), Bieniusa
- Programmierprojekt, B (Hörer anderer FBs), 2P, SS (D), Bieniusa

- Empirical Model Building & Methods, M, 2V+1Ü, SS (E), Jedlitschka
- Bus Systems, M, 2V+1Ü, WS (E), Kuhn
- Requirements Engineering, M(Inform.), B(SozioInform.), 2V+1Ü, WS (E), Dörr
- Einführung in die Sozialinformatik, B(SozioInform.), 2V+1Ü, WS (D), Dörr et al.
- Process Modeling, M, 2V+1Ü, SS (E), Heidrich
- Software Project and Process Management, M, 2V+1Ü, SS (E), Heidrich
- System and Software Architecture, M, 2V+1Ü, SS (E), Oliveira
- Automotive Software Engineering, M, 2V+1Ü, SS (E), Trapp
- Product Line Engineering, M, 2V+1Ü, WS (E), Becker
- Projekt Agile Methoden, B(SozioInform.), 2P, SS (D), Dörr

### Common offers

- Projekt, B/M, 4P, WS/SS (D/E), all
- Bachelor-/Masterseminar, B/M, 2S, WS/SS (D/E), all
- Bachelor-/Masterarbeiten, B/M, (D/E), all

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**Title**

M: Master (program), B: Bachelor (program)

**Language**

Winter / Summer

**Hours per week**

**Lecturer**

Requirements Engineering, M(Inform.), B(SozioInform.), 2V+1Ü, WS (E), Dörr