



**TECHNISCHE
UNIVERSITÄT
DRESDEN**

Fakultät Informatik, Institut für Software- und Multimediatechnik, Lehrstuhl für Softwaretechnologie

Softwaretechnologie II

Prof. Dr. U. Aßmann
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Institut für Software- und Multimediatechnik
Gruppe Softwaretechnologie
<http://st.inf.tu-dresden.de>
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➤ **Vorlesung:**

- Prof. Dr. Uwe Aßmann, Nöthnitzer Str. 46, 2. OG, Raum 2087
- Katrin Heber, Sekretärin. 0351 463 38 463
- Sprechstunde Mi, 11:00-13:00. Bitte bei Frau Heber anmelden.
- Email katrin.heber@tu-dresden.de. Bitte über Frau Heber kontaktieren, da emails an Prof. Aßmann oft nur verzögert beantwortet werden können

➤ **Vorlesung ist empfohlen für Jahr 3 (Bachelor und Diplom)**

➤ **Wichtigste Informationsquelle:**

- <http://st.inf.tu-dresden.de/teaching/swt2>
- <http://st.inf.tu-dresden.de/> -> Teaching -> Softwaretechnologie II

➤ **Übungsleiter: Sebastian Richly**

- Übungen können nur einen kleinen Teil der Vorlesung abdecken
- Ab Woche 2
- Semester ist in Komplexe aufgeteilt:
 - Ontologien
 - Anforderung sanalyse: ZOPP, Lasten- und Pflichtenheft
- Testen Regressionstest
- Reuseware
- Model Driven Architecture

- **Teilung der Übungsgruppen in kleine Gruppen á 4-5 Personen**
- **Zumeist 2-3 Woche Zeit zur Bearbeitung eines Komplexes**
- **Lösungen werden ins SVN eingecheckt und dann bewertet**
 - Nacharbeitung möglich
- **Alle Übungskomplexe müssen bearbeitet werden**
 - → Ansonsten Prüfung nur möglich als 2/0/0 Prüfung



- ▶ **01 Introduction**
- ▶ **02 What is Engineering?**
- ▶ **Part I Analysis and Validation**
 - Requirements Analysis
 - Testing
 - Reviews and Inspections
- ▶ **Part II: Design**
 - Functional design
 - Action-oriented design
 - Advanced Object-oriented design
 - Framework-based design
- ▶ **Part III: Earn Money with Software**
- ▶ **Part IV: Product Lines**
 - Transformational design and MDA

▶ **We recommend one of (reading instructions can be followed in one of them):**

- Helmut Balzert, Lehrbuch der Softwaretechnik, 2. Auflage. Heidelberg, 2000, ISBN 3-8274-0042-2 (deutsch)
- Bernd Brügge, Allen H. Dutoit, Objektorientierte Softwaretechnik, Pearson Studium
- L. A. Maciaszek, B. L. Liang. Practical Software Engineering. A Case Study Approach. Addison-Wesley. Modern book on SE, UML in action in several case studies.

▶ **Other good books, priority from top to bottom:**

- Ghezzi, Jazayeri, Mandrioli. Fundamentals of Software Engineering. Prentice Hall. Nice fundamented book. No fuzz, concrete.
- S. Pfleeger: Software Engineering – Theory and Practice. Prentice-Hall. Good book, not too deep, but broad.
- Van Vliet: Software Engineering. Wiley.
- R. Pressman. Software Engineering – A Practitioner’s Approach. McGrawHill



- ▶ **UML is required. It is expected that you learn UML yourself from a good book.**
- ▶ **We recommend one of:**
 - Online documentation on www.omg.org/uml
 - H. Störrle. UML für Studenten. Addison-Wesley (cheap, good!).
 - Leszek A. Maciaszek. Requirements Analysis and System Design – Developing Information Systems with UML. Addison-Wesley. Excellent concept book.
 - Object Management Group (OMG). UML - Unified Modeling Language. 2.0.
- ▶ **Other excellent books:**
 - Ken Lunn. Software development with UML. Palgrave-Macmillan. Many case realistic studies.



- ▶ **R. Thayer, A. McGettrick. Software Engineering: A European Perspective. IEEE Press. Good collection of papers.**
- ▶ **M. Dorfman, R. Thayer. Software Engineering. IEEE Press. Good collection of papers.**
- ▶ **John McDermid. Software engineer's reference book. Butterworth-Heinemann. ISBN 0-7506-0813-7.**
- ▶ **A. Endres, D. Rombach. A Handbook of software and systems engineering - Empirical observations, laws and theories. Addison-Wesley. Very good collection of software laws. Nice!**

- ▶ **E. Gamma et. al, Design Patterns, Addison-Wesley, ISBN 0-201-63361-2.**
 - This standard reference book belongs to the bookshelf of every software engineer!
 - Buy this now, if you want to visit "Design Patterns and Frameworks".
- ▶ **Others**
 - Rumbaugh et.al. Object-oriented modelling and design. Prentice-Hall.
 - Booch. Object-oriented Analysis and Design. Addison-Wesley.
 - In German: Heide Balzert. Objektorientierten Systemanalyse. Spektrum der Wissenschaft.
 - Prieto-Diaz/Arango, Domain Analysis and Software Systems Modelling, IEEE Computer Society Press tutorial, ISBN 0-8186-8996-X, 1991



- ▶ **C. Szyperski: Component Software. Addison-Wesley**
- ▶ **K. Czarnecki, U. Eisenecker: Generative Programming. Addison-Wesley**
- ▶ **U. Aßmann. Invasive Software Composition. Springer.**

- ▶ **B. W. Boehm, Software Risk Management, 1989**
- ▶ **F. Brooks, The Mythical Man-Month, Addison-Wesley, 1975**
- ▶ **G. Weinberg, The Psychology of Computer Programming, Computer Science Series, 1971.**
- ▶ **E. Yourdan: The Death March.**
- ▶ **P. Neumann: Computer Risks, Addison-Wesley 1995.**
- ▶ **David Thielen. The 12 simple secrets of Microsoft McGraw-Hill.**
- ▶ **Dana Sobel. Longitude. About John Harrison. Just a good book about an excellent engineer.**
- ▶ **Simon Singh. Fermat's last theorem. Just an excellent book about an excellent mathematician (Wiles) thinking excellently hard.**



- ▶ **J.L. Bentley, Programming Pearls, Addison-Wesley, 2. Auflage 1989, ISBN 0-201-10331-1**
- ▶ **J.L. Bentley, More Programming Pearls, Addison-Wesley, 1988, ISBN 0-201-11889-0**
- ▶ **J.L. Bentley, Writing Efficient Programs, Prentice-Hall, ISBN 0-13-970244-X, 1982**



- ▶ **Uwe Viggenschow. Objektorientiertes Testen und Testautomatisierung in der Praxis. Konzepte, Techniken und Verfahren. Dpunkt-Verlag, Heidelberg. www.oo-testen.de. Nice practical book on testing.**
- ▶ **P. Liggesmeyer. Software-Qualitätsmanagement. Verlag Spektrum der Wissenschaften, Heidelberg.**
- ▶ **Boris Beizer: System Testing and Quality Assurance, Van Nostrand Reinhold, New York, 1984, ISBN 0-442-21306-9**
- ▶ **Glenford J. Myers, The Art of Software Testing, 1979**
- ▶ **Nesi (ed.), Objective Software Quality, 1995, Springer LNCS 926, ISBN 3-540-59449-3**
- ▶ **N. Fenton, S.L. Pfleeger. Software Metrics – a rigorous and practical approach. PWS Publishing.**



- ▶ **Version control with subversion. <http://svnbook.red-bean.com/>, also available as paper book of O'Reilly**
- ▶ **Sommerville (ed.), Software Configuration Management, 5. ed., 1996**
- ▶ **David Whitgift, Methods and Tools for Software Configuration Management, Wiley, 1991, ISBN 0-471-92940-9**

▶ **On Writing:**

- A. Franklin Parks, J. A. Levernier, I. Masters Hollowell. Structuring Paragraphs and Essays – A Guide To Effective Writing. Bedford/St. Martin's. www.bedfordstmartins.com. Very good book.

▶ **Fogler/LeBlanc, Strategies for Creative Problem Solving**



Warning: Remarks on the Nature of the Course

- ▶ **A University is unlike a high school**
 - You should not expect to get a book, and that's it
 - Software Engineering is too broad for that, unfortunately
 - The lectures have to focus on most important things
 - You should not expect to be an expert after the course
- ▶ **Find your way from the lecture slides into the books**
 - Follow the reading instructions
 - Learn the additional material and read the additional readings
 - Follow the exercises in the groups
- ▶ **Expect to learn 3-4 weeks for the oral exam**
 - Don't wait until 1 week before the exam! That's too late...
- ▶ **Be aware: you have not yet seen larger systems**
 - Middle-size systems start over 100KLOC



Remarks on the Nature of the Course

▶ **The purpose of lecturing is**

- To give you a condensed insight on the most important topics, such that you do not waste too much time during reading
- To give you pointers for future work, once you left the course
 - If you haven't got the pointer, you can waste years in darkness

- ▶ **Learn about “engineering” software**
 - Engineering attitudes
 - Technology, process, experiences, human conditions
- ▶ **Get as many ideas as possible (broad overview)**
 - NOT: technical in-depth teaching (this must be left to other courses)
- ▶ **Get an introduction into the main obstacle: from a set of requirements, how do I arrive at a system? (forward engineering)**
- ▶ **Learn about systematic methods for graph-based specifications**
 - Because almost all requirements and design notations are graph-based
 - Get hold on the complexity of a large specification
- **Learn about the behavioral language Petri Nets, and derivatives thereof**

- ▶ **Know different forms of design methods**
 - functional, object-oriented, data-oriented
- ▶ **Know behavioral methods to generate code for verifiable specifications**
 - Petri nets
- ▶ **Know about “software architecture” and architectural styles**

- ▶ **Get simple overview of software processes**
 - MDA, XP, V-model,
- ▶ **Know what inspections are**
- ▶ **Know about maintenance problems**
- ▶ **Know about requirement specification**
- ▶ **Know about basic testing concepts**



Business models

Markets

Product lines

- ▶ **Design Patterns and Frameworks (WS)**
 - Basic design patterns
 - Design patterns in frameworks
 - Role-based design
 - Composition of design patterns
 - Layered frameworks
- ▶ **Component-based Software Engineering (SS)**
 - Black-box component models (e.g., EJB)
 - Grey-box component models (e.g., Aspects)
 - Software composition
- ▶ **Software-Management (SWM) (SS)**
- ▶ **Software-Werkzeuge (SEW) (WS)**
- ▶ **Enterprise Software (ES, Dr. Kubach, SAP, WS)**

Softwaretechnologie II
Entwurfsmethoden
Elementares über Produktlinien

Design Patterns and
Frameworks
Produktlinien mit
objektorientierter
Programmierung (OO
Komponentenmodell)

Software-Werkzeuge
Produktlinien mit
Werkzeugen
Technikräume

Software-Management
Wie man Projekte macht

Component-Based
Software Engineering
Produktlinien mit anderen
Komponentenmodellen



The End

- ▶ <http://st.inf.tu-dresden.de>