

Course Program ETSN20 Software Testing

2018 VT1, Per Runeson, last updated 2018-01-16 <http://cs.lth.se/etsn20>

Aim. The objective of the course is to give basic and advanced knowledge & skills within testing for large-scale development of systems completely or partly based on software. The course gives practical skills in methods and techniques for software testing.

Knowledge and understanding. For a passing grade the student must be able to:

1. define basic concepts and principles within software testing
2. give an account of the most common techniques for software testing
3. describe the relation between the software testing process and other processes in the product lifecycle
4. describe the relation between verification and the requirements of a software system in terms of functionality and quality
5. report an in-depth area of own choice, and demonstrate theoretical depth or practical application, related to the state-of-art of the area

Skills and abilities. For a passing grade the student must be able to:

6. motivate the choice of test strategy for a software system
7. analyze and create test cases for white box and black box testing
8. perform an inspection
9. apply a systematic approach for software debugging

Judgment and approach. For a passing grade the student must:

10. understand the complexity of the task to test a software system and be aware of the costs and impact of testing activities during the development of a software product.
11. be able to value and synthesize the information given in published scientific articles about software testing.

Course elements

- Seven *lectures* give a theoretical overview and help for private studies.
- One *guest lecture* gives a connection to industry practice
- Four *lab sessions* give practical training in applying different test techniques and relate theory to practice through discussions of problems and solutions.
- One *project* gives practical skills and training in different areas of software testing by literature search, analysis and presentation.
- *Written exam* assesses the individual skills.

Assessment

- The project is graded fail / G (pass) / VG (pass with distinction), based on project deliverables. Revised projects are graded pass.
- Approved lab sessions and project presentation are mandatory and required for passing the course.
- The final grade is fail / 3 / 4 / 5, which is based on the written exam and the project grade, where VG gives 5 extra points, for those who passed the 30 pass limit on the exam.

Exam + project points	Final grade
30-42.5	3
43-54.5	4
55-65	5

Literature

Books

K Naik and P Tripathy, *Software Testing and Quality Assurance: Theory and Practice*, Wiley, ISBN: 978-0-471-78911-6, 2008 (available via www.lub.lu.se)

N Matloff and P J Salzman, *The Art of Debugging with GDB, DDD, and Eclipse*. No Starch Press, ISBN: 978-1-59327-174-9, 2008, <http://it-ebooks.directory/book-1593271743.html>

Chapter

E Kit, *Software Testing In The Real World: Improving The Process*, Addison-Wesley, 1995. Ch 13

Articles

M Beller, A Bacchelli, A Zaidman, and E Juergens, Modern Code Reviews in Open-source Projects: Which Problems Do They Fix?, Proceedings of the 11th Working Conference on Mining Software Repositories (MSR 2014), pp. 202–211, 2014. doi 10.1145/2597073.2597082

- L Chen, Continuous Delivery: Huge Benefits, but Challenges Too, IEEE Software, 32(2): 50-54, 2015. doi: 10.1109/MS.2015.27
- V Garousi, M V Mäntylä, A systematic literature review of literature reviews in software testing, Information and Software Technology, 80: 195-216, 2016, doi 10.1016/j.infsof.2016.09.002
- J D Hagar, T L.Wissink, D R Kuhn, R Kacker,; Introducing Combinatorial Testing in a Large Organization. IEEE Computer 48(4): 64-72, 2015, doi 10.1109/MC.2015.114
- L. Jonsson, M. Borg, D. Broman, K. Sandahl, S. Eldh, and P. Runeson. Automated bug assignment: Ensemble-based machine learning in large scale industrial contexts. Empirical Software Engineering, 21(4):1579–1585, 2016, doi 10.1007/s10664-015-9401-9
- E I Laukkanen and M V Mantyla, Survey Reproduction of Defect Reporting in Industrial Software Development, International Symposium on Empirical Software Engineering and Measurement, 2011, pp. 197-206, 2011 doi 10.1109/ESEM.2011.28
- H Petersson, T Thelin, P Runeson, C Wohlin, Capture–recapture in software inspections after 10 years research--theory, evaluation and application, Journal of Systems and Software, 72(2):249-264, 2004, doi 10.1016/S0164-1212(03)00090-6.
- J A Whittaker, The 10-Minute Test Plan, IEEE Software, 29(6): 70-77, 2012. doi 10.1109/MS.2012.25

Articles for the project to be found in the LubSearch database (www.lub.lu.se).

Content

Week	Lecture	Lecture area	Literature	Project	Lab	Lab area
1	L1	Introduction, Unit test	Naik 1, 3, Garousi	Form groups + decide subject by Fri		
	L2	White-box test techniques	Naik 4, 5			
2	L3	Black-box test techniques	Naik 6, 9.2-9.6, Hagar		Lab1	White-box testing
3	L4	Debugging, Reviews, Reliability	Matloff 1 Naik 10.1-10.4, 15, Beller, Petersson	Tue: Deliver outline	Lab2	Black-box testing Report lab 1+2
4	L5	Lifecycle, Documentation	Naik 7.1-7.4, 12.1-12.9, Chen, Laukkanen, Whittaker	Meeting w supervisor	Lab3	Debugging No lab report
5	L6	Organization, Tools, Automation	Naik 12.10-12.16, 16.1-16.4 Kit 13, Jonsson		Lab4	Inspection and estimation Lab report
6	L7	Quality, metrics	Naik 13, 17	Fri: Final report		
7	Guest lecturer	Testing in practice		Presentation		

Schedule

	Week	Tu	We	Th
Jan 15-19	1	L1 8-10 MA:5 (PR)		L2 13-15 MA:5 (PR)
Jan 22-26	2	L3 8-10MA:5 (PR)		Lab 1 10-12, 13-15, 15-17 E:Saturnus (EB)
Jan29-Feb 2	3	L4 8-10 MA:5 (PR)		Lab 2 10-12, 13-15, 15-17 E:Saturnus (EB)
Feb 5-9	4	L5 8-10 MA:5 (PR)		Lab 3 10-12, 13-15, 15-17 E: Saturnus (AOA)
Feb 12-16	5	L6 8-10 MA:5 (PR)		Lab 4 10-12, 13-15, 15-17 E: Saturnus (AOA)
Feb 19-23	6	L7 8-10 MA:5 (PR)		
Feb 26- Mar 2	7	Guest lecture 8-10 MA:5		13-17 Project presentations (HM, EB, AOA) E:1147; 1149
Mar 12-16	Exam		Exam 8-13: MA 10C-D	

Personnel

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