

Course Program

ETSN15 Requirements Engineering

<http://cs.lth.se/krav>

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The objective of the course is to give basic and advanced knowledge and skills within requirements engineering for large-scale development of systems completely or partly based on software. The course gives both theoretical knowledge and practical skills in methods and techniques for requirements engineering. The course gives training in scientific paper reading.

1 Learning Objectives

1.1 Knowledge and understanding

For a passing grade the student must

1. be able to define basic concepts and principles within requirements engineering
2. give an account of several different types of requirements
3. be able to describe and value several different methods and techniques for requirements engineering
4. be able to describe and relate different sub-processes within requirements engineering
5. be able to describe the relation between the requirements engineering process and other processes in the product lifecycle
6. be able to describe the relation between requirements engineering and market-driven product management
7. be able to discuss some scientific results within requirements engineering research

1.2 Skills and abilities

For a passing grade the student must

1. be able to choose suitable requirements techniques for a given context
2. be able to apply several different techniques for requirements elicitation
3. be able to apply several different techniques for requirements specification
4. be able to apply several different techniques for requirements validation
5. be able to apply several different techniques for requirements prioritisation

The release plan defines which requirements that are implemented by the project group as mock-up designs in release R3, and which requirements are selected to be fully implemented in the imagined releases R4 and R5.

1.3 Judgement and approach

For a passing grade the student must

1. be able to consciously select a process depending on the nature of the requirements
2. show a systematic and long-term approach to processes
3. be able to consciously see the problem in the relation between the quality of requirements and the quality of the resulting implementation
4. be able to adequately involve users in the requirements engineering process
5. be able to consciously see the problem in the relation between requirements engineering and economical aspects of product development

2 Contents

The course includes theory and practice regarding the following topics:

1. Requirements on different abstraction levels and in different contexts
2. Sub-processes of requirements engineering and their relation
3. Specification of data requirements, e.g. using virtual windows and data models
4. Specification of functional requirements, e.g. using textual feature requirements and task descriptions
5. Specification of different types of non-functional requirements, e.g. usability, performance, reliability
6. Different techniques for requirements elicitation
7. Different techniques for requirements validation
8. Different techniques for requirements prioritization
9. Market-driven requirements engineering and product management
10. Requirements Engineering with and for Artificial Intelligence.

3 Course Elements

L: Lectures The lectures provide an overview of the literature. They do not cover every detail, but give a high-level structure of the subject and thereby aid self-studies of the literature. Discussions are promoted.

E: Exercises The main objective of the exercises is to support the project and prepare for the written exam through prototypical problems, by connecting theory to practice and to give opportunity to discuss details of RE techniques.

Lab: Computer lab sessions The lab sessions illustrate computer supported prioritization and release planning, and demonstrates the complexity of requirements selection and scheduling. Preparations are mandatory.

P: Project The project involves performing practical requirements engineering for a given case, and is carried out in groups of 6-8 students. The project involves a number of deliverables and a final project conference where the learning outcome of each project is presented. Project groups are established during the first course week.

W: Workshop The workshop theme this year is: **RE and AI**. Active participation is mandatory. No preparations are required. On legitimate absence, e.g. due to illness, an individual hand-in assignment is given instead.

4 Assessment

- The project is graded fail | 3 | 4 | 5 based on project deliverables.
- Approved lab session preparations and assignments are required for passing.
- The written exam has two parts:
 - Part A: Multiple-choice questions where at least 75% (preliminary limit) must be correct for passing, and
 - Part B: Written assignments with a total of 100 points of which at least 50p (preliminary limit) is required for passing the exam. Part B is marked only if Part A is passed.
- The final course grade on the scale fail | 3 | 4 | 5 is based on the written exam points from Part B and the project grade using the following mapping:

	Project: 3	Project: 4	Project: 5
	Exam points Part B		
Final: 3	≥ 50	≥ 50	≥ 50
Final: 4	≥ 75	≥ 67	≥ 60
Final: 5	≥ 90	≥ 83	≥ 75

5 Literature

The course elements and the written exam cover the following literature:

- Lau "Software Requirements - Styles and Techniques", Soren Lauesen, Addison-Wesley, ISBN 0-201-74570-4, 2002.
- LAB1&2 Preparations and instructions for Lab 1 and Lab 2.
<https://lunduniversity.github.io/krav/#labs>
- MDRE "Market-Driven Requirements Engineering for Software Products", Björn Regnell, Sjaak Brinkkemper, Engineering and Managing Software Requirements, Eds. A. Aurum, C. Wohlin, Springer, ISBN 3-540-25043-3, 2005.
- PRIOR "Requirements Prioritization", Patrik Berander, Anneliese Andrews, Engineering and Managing Software Requirements, Eds. A. Aurum, C. Wohlin, Springer, ISBN 3-540-25043-3, 2005.
- OSSRE "Understanding Requirements for Open Source Software", Walt Scacchi, Design Requirements Engineering: A Ten-Year Perspective, Springer, pp. 467-494, 2009.
- RP "The Art and Science of Software Release Planning", Günther Ruhe, Moshood Omolade Saliu, IEEE Software, November/December, pp. 47-53, 2005.
- QUPER "Supporting Roadmapping of Quality Requirements", Björn Regnell, Richard Berntsson Svensson, Thomas Olsson, IEEE Software 25(2) pp. 42-47 March-April 2008.
- PROTO "An empirically based model of software prototyping: a mapping study and a multi-case study", Elizabeth Bjarnason, Franz Lang, Alexander Mjöberg, Empirical Software Engineering, 28(5), 115, 2023.
- INSP "Att inspektera krav". Sid 67-76, Framgångsrik kravhantering, andra utgåvan, Teknikföretagen, Joachim Karlsson, V040072, ISSN 1103-7008, 1998.
- INTDEP "An industrial survey of requirements interdependencies in software product release planning", Pär Carlshamre, Kristian Sandahl, Mikael Lindvall, Björn Regnell, Johan Natt och Dag, Int. Conf. on Requirements Engineering (RE01), Toronto, Canada, pp. 84–91, 2001.
- AGRE "Agile Requirements Engineering Practices: An Empirical Study", Lan Cao, Balasubramaniam Ramesh, IEEE Software , January/February 2008, pp. 60-67, 2008.

6 Overview

	<i>Topic</i>	<i>Literature</i>	<i>When</i>
W1	L1 Introduction	Lau:1	Mon 15-17
	L2 Project kick-off, Elicit, Prio	Lau:8, PRIO	Tue 15-17
	P Project Mission v1		Deadline Wed 10:15
	E1 Requirements types, Context diagram	Lau:1	Wed 10-12
W2	L3 Specification 1, reqT	Lau: 2-4	Mon 15-17
	L4 Specification 2		Tue 15-17
	P Project Mission v2		Tue 23:59
	P Supervision meeting		Contact supervisor
	E2 Elicitation	Lau: 8	Wed 10-12
W3	Lab1 Reqs Modelling, Prio	LAB1	Thu or Fri; see Canvas
	L5 Agile RE, Prototyping,	AGRE, PROTO,	Mon 15-17
	L6 Product mgmt, Release planning, Open source RE, Interdep.	MDRE, RP, OSSRE, INTDEP	Tue 15-17
	E3 Functional reqts, Prototyping	Lau:2-4	Wed 10-12
W4	P Release R1		Deadline Sun 23:59
	L7 Specification 3, Quality, Lifecycle	Lau:5-7, QUPER	Mon 15-17
	E4 Quality requirements	Lau:6, QUPER	Wed 10-12
	P Supervision meeting		Contact supervisor
W5	W Mandatory Workshop: RE & AI		Tue 15-17
	L8 Validation, exam prep	Lau:9, INSP	Mon 15-17
	E5 Validation	Lau:9, INSP	Wed 10-12
	Lab2 Prioritization, Release Planning	LAB2	Thu or Fri; see Canvas
	P Release R2		Deadline Sun 23:59
	P Validation Checklist <i>send to validation group</i>		Deadline Sun 23:59
W6	P Supervision meeting (W6 or W7)		Contact supervisor
	P Validation Report <i>send to authoring group</i>		Deadline Thu 23:59
	P Project presentation slides (pdf)		Deadline Mon 08:00
W7	P Disscussant questions (pdf)		Deadline Mon 15:00
	P Project presentation (mandatory)		Mon 15-17
	P Release R3		Deadline Sun 23:59
	Exam	All literature	March 20, 14:00-19:00

7 Online Resources

For more contact information, schedule, etc., visit online resources here:

- Open homepage with course material including lectures, exercises, labs, etc.:
<https://cs.lth.se/krav/>
- Closed resources and hand-ins:
<https://canvas.education.lu.se/>
- Open source – contributions welcome:
 - Course documents:
<https://github.com/lunduniversity/reqeng>
 - Educational tool:
<https://github.com/reqT/>
 - Home page source:
<https://github.com/lunduniversity/lunduniversity.github.io/tree/main/krav>