

name	excursion
hours	6
type	trip
contents	The students will visit one or more companies that are involved in developing systems with robustness requirements.
bibliography	-
expected effect	The students will experience industrial approaches to robustness.

name	aspects of robustness
hours	6
type	lecture, working groups
contents	In the lecture we will discuss aspects of robustness in different fields with a focus on engineering, and see examples for robust and not so robust systems. Students will learn about the importance of robustness.
bibliography	http://en.wikipedia.org/wiki/Robustness J. M. Carlson and John Doyle, Complexity and robustness, PNAS 2002 99 (Suppl 1) 2538-2545; doi:10.1073/pnas.012582499
expected effect	The students know how to identify robustness properties in different systems, especially in their area of research.

name	Robust engineering
hours	6
type	lecture, working groups
contents	In the lecture we will investigate how to ensure that a system we engineer will be robust to certain criteria. We will see examples for robust engineering processes from different fields and identify similarities and differences.
bibliography	http://en.wikipedia.org/wiki/Taguchi_methods Tom Limoncelli, Resilience Engineering: Learning to Embrace Failure, ACM Queue, September 2012, http://portal.acm.org/ft_gateway.cfm?id=2371297&type=pdf Joseph S. Bobinis, Robust Engineering Methodology, Parts 1-3, http://www.realinnovation.com/content/c091130a.asp http://www.realinnovation.com/content/c091207a.asp http://www.realinnovation.com/content/c091214a.asp
expected effect	The students learn about the relation between the process and robustness criteria.

name	Requirements engineering
hours	6
type	lecture, working groups
contents	In the lecture we will investigate how to identify robustness requirements relevant for a project, and how to maintain and realise these criteria throughout the development process.
bibliography	http://en.wikipedia.org/wiki/Requirements_analysis Jeffrey O Grady, System Requirements Analysis, Academic Press, 2006. Available at the course.
expected effect	The students learn about systematic approaches to identifying requirements and ensuring that they are addressed in engineering processes.

name	Analysis of a process
hours	6
type	explorative interactions
contents	The students will work in groups to explore an example for a well established, robust process, and analyse how robustness is achieved in this exemplaratory process, and try to identify possible shortcomings.
bibliography	-
expected effect	The students apply the acquired knowledge to a real world example and explore the process.

name	Robust processes
hours	6
type	lecture, working groups
contents	In the lecture we will discuss aspects that make processes robust, and how the process becomes part of the robust engineering. This will be based on the results of the analysis of a process.
bibliography	-
expected effect	The students get a broadened understanding of the role of the process in engineering robust systems.

name	The next catastrophe
hours	6
type	lecture, working groups
contents	In the lecture we will see a series of systems that are not robust and discuss why they failed, and how the process around them could have been extended to make them more robust. We will also discuss the relation between system complexity and robustness.
bibliography	Charles Perrow, The next catastrophe, Princeton University Press, 2011. Available at the course. Charles Perrow, Normal Accidents, Princeton University Press, 1999. Available at the course.
expected effect	The students will train their critical approach to system design.

name	Final exam
hours	2
type	exam
contents	The final exam, this is where the students get to show off their newly acquired knowledge.
bibliography	All of the aforementioned bibliography
expected effect	Students who pass will have acquired a basic understanding of robust system design and will be able to use it in their engineering field in the future.