

## Requirements Analysis and Project Design Guidelines

### Marking Criteria:

The following criteria are used in evaluating these two documents

Description	
A	Introduction: project goals are clear, structure of report is clear
B	Requirements: reflect the client's request, are complete, are relevant and prioritized, are clear and not ambiguous (no room for interpretation), can be traced and tested
C	Design proposal: is tied to requirements, is complete and viable, includes good arguments for design choices, includes listings of parts / systems, is clear and not ambiguous
D	Design proposal: includes visuals (Schematic / layout / drawing / illustration / block diagram / mock-up / wireframes / prototype pictures / Gantt charts) where necessary for better understanding
E	Conclusion: critical characteristics and next steps are clear
F	Overall: formatting, language and design

### Tips for requirements analysis and project design documents:

*All engineering projects will involve a stage where you make sure that you and your team correctly understood expectations and needs of your customer (and other stakeholders). In the industry, the requirements analysis - also called functional specifications - is often done by the product manager or a sales person. The project design document is then created by the engineering responsible as a proposal of how to integrate all requirements.*

*Requirements = what do the stakeholders want in the product, what points are important for the system to be functional*

*Design = what is your suggestion to create a final product which fulfils the requirements*

*Do not confuse these documents with a data sheet / spec sheet which rather summarizes the performance of a system and how to handle it.*

*Engineering documents are usually written in third person / impersonal. Language should be concise and factual, not conversational / emotive. Visualisation is a powerful tool for such documents. Pictures / diagrams are good to supplement text and give the reader a better understanding of the design, they should however not just fill pages without explanatory text. Don't forget page numbers.*

### Structure:

- 1) Introduction - summary of project, overall goal that the design needs to be able to fulfil, purpose of this document, what will be discussed in the following sections
- 2) Nomenclature if needed, List of Figures and List of Tables optional
- 3) Requirements in detail (customer, functional, architectural, etc), including list of stakeholders
- 4) Proposed design with details
- 5) Conclusion – what are the most critical characteristics of the design, what are the next steps that you will take to successfully build the design
- 6) Reference list optional

Include a section in the introductory page, where it is listed in details, which student worked on which part of the project and/or document. The grade however will be given for the whole team.

The document should contain around 2-4 pages \* students in team for section 3) and 3-5 pages \* students in team for section 4).

### More detailed explanations:

#### 3) Requirements in detail

Prioritize the requirements to clearly communicate their relative importance and the sequence in which you implement them. Mark critical (important or possibly problematic) characteristics. Enumeration of requirements makes it easier to later on refer to them in either the project design part or the quality and testing document.

For hardware systems:

- Requirements can be documented as use cases, user stories, or functional specifications.
- For functional specifications indicate in which ranges the function has to be given (sensor measurement range, size range, power range, etc.) including tolerances
- Possibly generate a Product FMEA for the most important safety-related points (optional)
- Don't forget aspects like safety, interaction to environment and other parts, user-friendliness, repairability, etc.

For software systems:

- Requirements can be documented as natural-language documents, use cases, user stories, or process specifications
- Requirements usually include a summary list and / or a more detailed description of every requirement
- Don't forget aspects like function interdependence, code-readability, user-friendliness, etc.

#### 4) Proposed design with details

Indicate the look, feel and functions of the system. Describe why you have chosen a certain design over another. Possibly include a time-plan with the critical path indicated (Gantt Chart or similar).

For hardware systems:

- Schematic / layout / drawing / illustration / block diagram of design
- Possibly have a simulation or pre-test which verifies your most critical assumptions
- Define source / supplier of parts where already known with prices and explain possible deviations of requirements if not solvable (if the project is about creating a design proposal for a building a device in a subsequent semester, this point will only be covered in the final report)
- Available functions

For software systems:

- Mockup, wireframes or working prototypes which visualise user interface and most important functions
- System architecture
- Available functions

For more information:

Google “good requirements document” and “good design document” (or the same with bad)

<http://de.slideshare.net/guest24d72f/8-characteristics-of-good-user-requirements-presentation>

[https://en.wikipedia.org/wiki/Software\\_requirements\\_specification](https://en.wikipedia.org/wiki/Software_requirements_specification)

[https://en.wikipedia.org/wiki/Requirements\\_analysis](https://en.wikipedia.org/wiki/Requirements_analysis)

<http://asq.org/learn-about-quality/process-analysis-tools/overview/fmea.html>