

## Overview of the Lab types

There are two kinds of labs:

### - Tutorials

Tutorials are not actually labs. They are intended to introduce the design flow of the employed design tools. Tutorials do not require defending and no points are awarded for doing them.

### - Labs

Labs form the basic core of the course. In order to pass the lab, it MUST be completed and defended within the deadline. Each successfully passed lab increases the final grade up to the maximum of 60 points. If the lab is not completed within the deadline, no points will be awarded for it. If Labs 1-3 are passed during the first 9 weeks of the lab course, then 5 bonus points are awarded. If ALL labs are passed before the end of the lab course (16<sup>th</sup> Week included), then 5 bonus points are awarded.

Following is the approximate schedule of lab sessions during the course:

### - Tutorials

Week 2: Tutorial (part 1)

Week 3: Tutorial (part 2)

### - Labs (first half)

Week 4: Lab 1 (Logic Gates) 5 points

Week 6: Lab 2 (Combinational Logic) 10 points

Week 8: Lab 3 (Structural Design) 10 points

### - Labs (second half)

Week 10: Lab 5 (Sequential Logic) 15 points

Week 13: Lab 6 (Creeping Line Project) 20 points

Following is the list of requirements and comments concerning the labs in general (this list may be updated during the course):

- the deadline for passing the lab course is 16th week;
- labs are done individually;
- labs are passed (showed and reported) in the same order as they are listed;
- if the lab is broken into several stages (bullets in the task), each stage (bullet) requires a separate visual demonstration;
- in case there is a good reason for failing to meet any of the lab deadlines, please, get in touch with lab assistant/lecturer in order to resolve this issue;
- lab manuals contain the task description and an example solution of a similar task (NOT the one that is required to be solved).

## Passing a lab

Each lab is passed in three steps:

### Step 1: Visual demonstration

The general functional correctness is examined during the lab session. Most of the labs are broken into several stages (bullets in the task), each stage (bullet) requires a separate visual demonstration. During visual demonstration the lab solution should be presented and explained (includ-

ing testbench and simulation results). This is a preliminary check, thus, if during the later steps it turns out that the lab was done incorrectly, this step may be again repeated for the corrected version of the design.

**Step 2:** Submission of the report and source files (required for Lab 2 and Lab 5 only)

A more detailed evaluation of the lab solution is done. Report is written in free form (see “Writing Report” section below for further details). For examples google "how to write lab report...". All source files are sent separately along with the report (only the relevant files that contain the final version of the design). Use “Archive Project” option of the Vivado, be sure to uncheck “Include run results” box (see Vivado Tutorial for details). The reports should be sent in PDF format to ALL e-mails that are specified in the “Reports and source files” section on the lab webpage. In case something is missing or additional corrections/clarifications are required, the report will not be accepted until all issues are resolved.

**Step 3:** Defense of the lab

This step involves answering questions regarding the submitted report and/or source files (over e-mail for Lab 2 and Lab 5, during lab session right after Step 1 for other labs). During defense be ready to answer ANY question related to the submitted designs, reports and lab topics in general.

The results (progress) can be viewed on the lab webpage by following the "Results" link.

## **Writing report**

There are no strict rules concerning writing of the lab reports (formatting, section breakdown, length, etc.). In general the goal of lab report is to document the workflow, to describe the results and their significance and to demonstrate the writer's comprehension of the concepts that has been introduced in the lab. Following is the list of topics (not necessarily a section breakdown) that are expected to be more or less covered in the lab report:

**- Introduction**

Define the main purpose, objectives and learning context for the lab. If the lab involves some kind of research work, provide an assumption or estimation of the expected outcome.

**- Background**

Provide the necessary background sources for all notions and concepts that are used in the lab (e.g. information given in the lab manual, lecture notes, prior courses, textbooks, internet, own experience, etc.)

**- Workflow**

Describe the chosen method/approach for solving the task and the way it has been applied.

**- Results and Discussion**

Report the outcome of the lab, try to analyze and explain the results. How do these results compare with the expected outcome?

**- Conclusion**

Summarize everything that has been done. Conclude whether the lab has been done successfully

or not. Provide details of what have been learned. Give a feedback for the lab (opinion, suggestions for improvement, comments, etc.)

### **- References**

List all the sources that are cited in the report in order of appearance.

### **- Appendices**

Appendices contain the information that is not included in the main part of the report and that cannot be found in the referenced sources, but may still be of use to the reader/evaluator.

Students are highly advised to start working on the lab report before coming to the lab room and actually doing the lab itself. Following is the list of steps that may be done to prepare for the lab:

- Read the manual, understand goals and objectives of the task. Consult with lab assistants in case there are questions or something is not completely clear;
- Check lecture slides, recommended literature, etc. to fill the necessary theoretical background;
- Prepare the plan for solving the lab task. Complete all the steps that can be done outside the lab beforehand;
- The free version of the software tool that is used for doing the labs can be downloaded from the manufacturer's website. This allows to create and to simulate the sources files in advance.

Documenting the above mentioned steps should already cover Introduction, Background and part of the Workflow topics. Also, at this point the list of references should be more or less complete. During the lab time finish the remaining steps for solving the task, at the same time document the rest of the workflow to completely cover the Workflow topic. In this way by the time the lab is done the only topics left to cover in the report are Results and Conclusion.

Following is the list of MUSTs concerning the content of the lab report (this list may be updated during the course):

- reports MUST feature things that are specifically required to be included in the lab task description;
- all objects (charts, figures, tables, code listings, etc.) MUST be numbered and labeled with a descriptive title;
- all figures, tables, code listings, statements, results in the report MUST be explicitly explained;
- complete source codes MUST not be part of the report (since all sources are also being sent along with the report);
- all materials (charts, figures, tables, code listings, citations, etc.) that are taken from external sources MUST be referenced within the text.