Regulations for Laboratory in Digital Circuits Theory

Laboratory objectives
The primary objective of the laboratory is getting familiar with the work of real, commercially available logic elements and systems, learned theoretically within the lecture and classes of DCT course.

Organisation of laboratory classes
Laboratory exercises are performed according to a detailed schedule, for the whole group in the laboratory room 320. During introductory classes the group can be divided into some number of sections of the same cardinality (or ±1 person). During laboratory exercises sections can be further divided into subsections by instructors, but this division is executed dynamically and can change from exercise to exercise, depending on availability of laboratory modules. In the semester there are two series of exercises and terms dedicated to introduction, writing tests, and making up for absences. Specific dates and topics for all exercises to be performed are listed in the schedule, which can be changed due to unforeseen events.

Topics of laboratory exercises and references
Topics covered during laboratory exercises and implemented circuits refer to the content presented in lectures, classes, didactic material provided, and references, in particular:


<table>
<thead>
<tr>
<th>Exercise number</th>
<th>Exercise topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Combinational circuits</td>
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<td>3</td>
<td>Bistable devices</td>
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<td>4</td>
<td>Asynchronous sequential circuits</td>
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<tr>
<td>5</td>
<td>Synchronous sequential circuits</td>
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<td>6</td>
<td>Selected arithmetic circuits</td>
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<td>9</td>
<td>Registers</td>
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<td>10</td>
<td>Counters</td>
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<td>11</td>
<td>Implementing logic functions with MUX and DMUX</td>
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<td>12</td>
<td>Computer aided design for circuit development</td>
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<tr>
<td>14</td>
<td>Microprogrammable circuits</td>
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</table>

There are also specific instructions for laboratory available on-line through ZMiTAC website.

Additional reference texts:

Conditions for obtaining a credit:

To be admitted to the laboratory students need to satisfy conditions of the general regulations for study at the Silesian University of Technology. To perform laboratory exercises, students need to sign the statement confirming their familiarity with these Regulations for Laboratory in DCT and Safety Regulations.

To obtain the final grade for the course, each of the laboratory exercises has to be completed, for which the requirements are as follows:

1. Preparation for laboratory classes. To be allowed to perform a laboratory exercise, students need to demonstrate their knowledge of material covered by this exercise, basing on topics discussed during lectures, classes, in references, and additional didactic material, present solutions to tasks in instructions for all exercises. All students should bring their own solutions for all listed tasks to be performed during laboratory, in the traditional handwritten form (which cannot be xerocopied). The notes should be prepared in such way that basing on them it is possible to start implementation without any delay, regardless of a task given for realisation and whom it is given to. People without notes and complete solutions, or with insufficient knowledge will be refused admittance to the laboratory and asked to leave, which is equivalent to an absence.

2. Attendance. Attendance for all laboratory exercises is mandatory. In case of absences (for whatever reason) students need to make up for it within the same series of exercises, in a term agreed with the exercise instructor. A date and time of making up for the absence need to be set with the instructor before the end of the first exercise immediately after the absence. The permission for making up for some exercise can be conditioned by the cause of absence.

3. Performing given tasks. After completion of each stage of the exercise, the results should be presented to the instructor for verification and confirmation. When tasks are only partially completed, the exercise instructor decides whether they can be accepted, or if they have to be performed once again.

4. Submitting a report which receives the status of being accepted. Reports are prepared for all performed exercises. Reports can be prepared individually, in sub-sections, or sections, in each case the content should represent all tasks executed by all students whose names are listed on the title page, as well as any additional tasks given by the instructor to be performed at home. When the report is prepared by a group of students, any random events (such as sudden illness, hospitalisation, accidents, etc.) which make it impossible to submit the report in time, constitute an excuse only for the immediately concerned person. Any problems with Internet access or computer malfunction at the last moment do not excuse a missing report. A report needs to be prepared in some text editor and sent as a PDF file (without any compression) by ZMiTAC database to the exercise instructor. The template and example for the report are available for download on-line. A report from an exercise should be submitted before the next scheduled exercise. In case of missing report the students receive (2.0) grade for the exercise and the deadline for submitting the report is extended to the next scheduled exercise. If with this extended deadline the report is still not
submitted, the students will not be permitted to perform the exercise and it can cause failure to receive the final grade for the course. If there are any errors or missing elements in a report, it is returned for revision and correction. In such case the exercise instructor provides comments to the elements which need to be corrected or added. In some specific situations the instructor can request a printed version of the report for the purpose of making notes on it, or direct personal contact to discuss the report. After revision the report should be submitted once again within a week. The process of revisions and resubmissions can include several iterations, and it ends when the instructor accepts the report by giving it the accepted status, or when students resign from taking the course. The detailed content of the report is always specified by the exercise supervisor. The report needs to be the original work, authored by students. Including elements authored by someone else is acceptable as long as the source is directly stated, and when there is a valid reason for such inclusion. Any violation of plagiarism laws will bring severe consequences.

5. Receiving at least one positive grade for each exercise. Grades can be received while performing an exercise (basing on demonstrated knowledge, efficiency shown in circuit implementation, or in short written tests), through the submitted report, or from the tests written in the dedicated terms scheduled for such purpose. If the first grade is not positive, then two repeats can be taken. During the term scheduled for making up for absences and tests, students need to write tests for all exercises for which there is either no grade, or a negative grade. There can also be written tests for exercises with positive grades which are considered as unsatisfactory. In case of receiving positive grades for all performed exercises a student does not have to attend the term scheduled for writing tests or repeats.

Reports

The objective of report is to provide a formal documentation for the performer exercise. A report can include some theoretical introduction, but this element is not obligatory, and should be added only when it consists of original own observations and comments directly connected with the exercise topic and solved tasks.

The report has to include:

1. The title page, completed accordingly to the template given.
2. Full texts for all tasks, formulated formally and without any ambiguity.
3. All detailed stages of obtained solutions with detailed comments, with correct terminology.
4. Presentation of the obtained solution. Logic diagrams should reflect implementation in the laboratory, with standard symbols for logic elements, of the same type and size as used, activity levels. Inputs and outputs of elements should be marked correspondingly to their functions.
5. Comments with respect to the process of verification, testing, and running of the implemented circuit.
6. Conclusions. It is advisable to include description of encountered problems, made mistakes, failed trials, conclusions from which led to the final correct implementation.

The report should not include:

1. Any parts authored by someone else (that includes drawings, diagrams, etc.), even if in access to the source some kind of registration was required or costs were incurred. If there is a valid reason for such inclusion, the source should be directly specified; otherwise it is a theft of intellectual property.
2. Solutions for the tasks not performed in the laboratory, with the exception of additional tasks given by the exercise supervisor for solving at home.
3. Solutions and implementations with different approach and different elements than those specified during the laboratory exercise.

4. Comments to revisions, communication between students and the exercise supervisor. The report should be written in correct English language and consists of at least two pages, since the template for the title page is set, and apart from the elements of the template nothing else can be placed on this page. There is no upper limit on the number of pages, but report with needlessly increased size (for example resulting from large line spacing) will be returned. Furthermore, in case of very large file size sending through the database system can become problematic. Whatever the circumstances, the reports must not be sent by e-mail.

**The final grade**

The grade from each exercise is an average of all grades received for this exercise. The final grade for the course is an average of grades from all exercises. When the average is lower than 3.0, but all requirements for receiving the credit for the course are satisfied, the final grade is set as 3.0.

Receiving a grade basing on grades received in the past, for single exercises or for the whole course is possible with the agreement of the general supervisor of the laboratory. Such consent must be given before the first exercise in the laboratory schedule for the semester starts.

**Records of laboratory classes**

Records of laboratory exercises are stored only in electronic format (with the exception of the traditional signing the statement confirming familiarity with the regulations and the lists of attendance providing documentation for POWR project) through ZMITAC database: [https://db.zmitac.aei.polsl.pl/baza/st_login.html](https://db.zmitac.aei.polsl.pl/baza/st_login.html). Within the DCT Laboratory course available information includes the list of exercises, the detailed schedule of exercises, records of attendance, received grades, status of reports, and announcements. Through the database students submit their reports. Students should regularly check for announcements, changes of status for submitted reports, etc. In case of discovering any discrepancies, they should be reported to exercise instructors as soon as possible.

**Other regulations**

If the laboratory regulations are violated and students do not accept the decision of their instructor, they can present their case in the written form to the general supervisor of the laboratory. The final decision is made after considering all circumstances and explanations, taking into account the general attitude demonstrated during classes by students.

In cases not covered in regulations, the decision belongs with the general supervisor of the laboratory.

Any temporary solutions to encountered problems **do not** become new rules or precedents to be referred to in the future.
Safety Regulations

1. Entering the laboratory and starting exercises without the permission and supervision is forbidden.
2. The students allowed to be present in the laboratory room are only those performing some exercises or who have been admitted to by a supervisor.
3. During an exercise the laboratory equipment should be treated with respect and care, and the station and its closets surroundings organised. For any damage of elements students will be held financially responsible, either individually or as a group.
4. The only person who can switch on and off the power is a supervisor.
5. Any occurring problems posing a threat, in particular with electrical equipment, should be reported to a supervisor immediately.
6. After finishing an exercise the place of work should be left clean, with disconnected elements and wiring.
7. Removing and exchanging any elements of the equipment in the laboratory is allowed only under supervision.
8. Eating, drinking and smoking in the laboratory room is strictly forbidden.
9. All elements of outerwear (cloaks, coats, jackets, hats, scarves, gloves, umbrellas, etc.) should either be kept on by their owner for the entire time (or in their bag, rucksack, etc.), or left in a cloakroom. It is forbidden to put them on chairs, table tops, windowsills, etc.
10. Any operations and manipulations of elements must be limited to those and only those necessary for completion of a given task.
11. While in the laboratory room, students should stay by their station. Student can leave the laboratory only by leave of an exercise supervisor.
12. Any occurring accidents should be reported to a supervisor without delay.