The following is the set of lab rules, policies, and guidelines which must be strictly followed by all students of *Digital Logic and Computer Systems* throughout the **entirety** of the semester. As a student of *Digital Logic and Computer Systems*, in the Homework 0 Quiz you will acknowledge and affirm that you have read and understood the *Lab Rules & Policies* and that you agree to abide by all lab rules, policies, and guidelines set forth within the document (and also those specified in the *Lab Submission Template,* syllabus, and slack rules). Until such time as you meet this requirement, you will be subject to receiving a grade deduction on all assignments, as well as being subject to "no admittance" into any lab sessions.

Notwithstanding anything set forth herein, these lab rules, policies, and guidelines shall be subject to written revision at the sole discretion of Dr. Schwartz, or of the **U**ndergraduate **P**eer **I**nstructors (from here on referred to as **UPI**s, **PI**s, or Peer Instructors) deemed qualified by Dr. Schwartz from time to time. If at any time the student has any questions or concerns regarding the subject matter of this document, it is the responsibility of the aforementioned student to speak directly with Dr. Schwartz.

Interpretation and enforcement of these lab rules, policies, and guidelines shall be at the sole discretion and determination of Dr. Schwartz, or of any of the Peer Instructors deemed qualified by Dr. Schwartz. Furthermore, the rules and policies laid out in this document may extend to any and all situations relating to the lab (e.g., lab quizzes), whether or not the student is physically located within the lab room.

1. Lab safety is always of utmost importance. It is required that the student uphold any rules regarding safety imposed either as set forth in this document or as announced or otherwise noted by Dr. Schwartz or Peer Instructors within a lab setting. Since we **NO LONGER SOLDER IN 3701**, eye protection and masks are not required in our lab rooms.
2. The student must not bring any food, drinks, or illegal substances into the lab (unless medically necessary).
3. **It is required that the student work individually on all lab assignments, with the exception that help may be solicited from either Dr. Schwartz or from the Peer Instructors, when deemed appropriate by Dr. Schwartz or Peer Instructors. Additionally, the student may solicit help from others in regard to general concepts, although the student may NOT copy or use another individual's (e.g., a present or past student's) intellectual property. The term *intellectual property* as used herein shall be deemed to include, but is not limited to, hardware and software designs, in part or in whole.**
4. The student understands that the only valid interpretation of any of the lab documents is from that of either the course instructor, or of any of the Peer Instructors deemed qualified by Dr. Schwartz. Dr. Schwartz may select any number of Peer Instructors to act on his behalf, for whatever purpose, at any point within the semester. It is the responsibility of the student to speak with Dr. Schwartz, or with any of the PIs, to confirm that their understanding of the given materials is correct.
5. **Unless given written permission by the course instructor, each lab assignment must be completed and submitted prior to a lab session. These submissions are otherwise known as pre-lab assignments. The student must submit the following deliverables through *Canvas* at least fifteen minutes prior to the beginning of their scheduled lab section time. Only submissions posted before the relevant deadline will be graded. Furthermore, if the student does not post a submission for the lab assignment by the relevant deadline, or if a submission is posted following this deadline, the student will not be admitted into (or will be removed from) the relevant lab and will receive absolutely no credit for that lab and any related (e.g., quiz) assignment.**
    i. A computer-generated **pre-lab report** (also known as a **lab report**), submitted as a single PDF file (named *labN.pdf*, where *N* should be replaced with the relevant lab number), following the relevant lab document(s) and **using the lab template provided on the course website**. The provided submission template includes a header that the student must accurately fill in, as well as the following sections. (If any of the following sections do not apply for a specific lab, the student must write "N/A" following the relevant section heading.)
        a) **Header**. In this section, the student must put the relevant lab number and title, their name, their lab class number (five digits), their PI's name, and a relevant date in the heading on the first page of the pre-lab report.
        b) **Requirements Not Met.** In this section, the student must briefly list any lab requirements that were not fully completed, if applicable.

c) **Problems Encountered**. In this section, the student must describe any problems that were encountered when attempting to complete the lab. For any problems resolved, the student must document their solutions and techniques attempted, including any solutions that did not resolve the initial problem. For any problems unresolved, the student must state what was tried, as well as state which aspects of the required pre-lab function and which aspects do not function.

d) **Future Work/Applications.** In this section, the student must describe *briefly* how, if provided with more time (or ambition), the work in the pre-lab could be extended for another purpose, where the possibility of different hardware and software would be permitted. This section of the report, as well as all other sections listed previously, must be limited to the first page of the relevant document, and a page break should follow.

e) **Questions or Exercises.** Most labs will require responses to pre-lab exercises. In this section, the student must copy any of the provided exercises, and include a response for each, where the response must directly follow the copied exercise text. A page break should follow this section.

f) All **schematic** (.bdf) files must have the following text at the top left with the format given below, but replaced with your personal information. All labs, starting with lab 1, will have schematic (.bdf and/or .vhd) and simulation (.vwf) files.

```
* Lab 3 Part 7
* Name:  Al E. Gator
* Class #:  37420 [a five-digit number]
* PI's Name:  Tim Tebow
* Description:  This circuit uses a widget to generate a whatsit.
```

Schematic (bdf) files without the above information **will <u>NOT</u> be accepted**.

1) When relevant, put the equation on the schematic.
2) **VHDL** files should contain similar information in comments.
3) **ASM** (assembly language) files (and the associated **mif** files) should contain similar information in comments.

g) Whenever your design is with discrete components on a breadboard, entirely inside the PLD, or both, you must have a schematic. It should label the identity of devices connected (e.g., resistors, switches, and LEDs, ICs, etc.). All IC pins you connected should be labeled with their pin numbers. Therefore, you should find and read the relevant datasheets and transfer the relevant information to your schematic.

1) The schematic should be simple, but clear enough so another classmate could correctly construct it without referring to any datasheets.
2) Generally, you should use Quartus to design your circuits (although Quartus will not be useful for switches, LEDs, and resistors, which will need to be drawn separately or on top of the Quartus bdf design).
3) All schematics must be readable and clear.

h) Every **simulation** file/screenshot must be **meaningfully** annotated. The purpose of the annotations is to demonstrate to Dr. Schwartz or PIs that the design is correct. Simulations with incoherent or nonexistent annotations will not be accepted.

1) When you create a simulation, organize your signals in a way that makes sense. Typically, this means (from top to bottom), special signals first (e.g., Reset, CLK, etc.), inputs next (MSB to LSB), and outputs last (MSB to LSB).
2) Signals should be grouped appropriately (and often by bus). For example, if you have a simulation for a multiplexer (MUX), you should NOT group S1, S0, D3, D2, D1, and D0 as a single group called "inputs." Instead, you should group them (as you would on paper) as S[1:0] and D[3:0].
3) ~~If the simulation type is not specified, it is okay to submit a functional simulation for purely combinatorial problems. For sequential circuits, always submit timing simulations.~~ Since Quartus no longer supports timing simulations for our PLD, this item was removed.

4) When the number of inputs gets very large (more than five), simulations generally do not show all possible input combinations, but only a subset of input values.
   i. Representative cases that demonstrate the proper functionality of your device (e.g., and ALU) should be such that it demonstrates that your design works as expected.
   ii. For example, if A = B = 0011_2, then A AND B and A OR B are the same thing (i.e., A). These tests therefore do not give much useful information. Therefore, this is a **BAD** choice.
   iii. On the other hand, if A and B are different, it may be clear at least that the AND and OR functions result in possibly different values. Note that a single test is not conclusive of the proper functioning of a circuit.
5) Simulations that do not follow these requirements in will be penalized accordingly.

ii. **Quartus archive file(s)**. Quartus archive files contain all Quartus design (bdf and/or vhdl) and simulation files. Each lab archive file submitted on Canvas must have the following format: `Lab#p.qar`, where `#` is the lab number and `p` is the part of the lab. For example, `Lab3b.qar`, would be the archive file for lab 3, part b.

iii. **Assembly language (asm) files** and **memory initialization (mif** or **hex) files**. Submit these files when utilized.

6. The student must create and submit a video of no more than three minutes in duration for each lab. This video is meant to streamline the time for real-time lab demonstrations. But the student should be prepared to demonstrate their labs as if the video was not submitted. (It is probable that the better the student's video, the less the student's PI will require in a real-time demonstration.) Specifications of the video are as follows:
   i. All video should start with you (your face) stating your name and the lab number. The video should end the same way. You must maintain professionalism in the video, i.e., do not say or show anything inappropriate.
   ii. Several (but probably not all) major requirements specified in the lab should be demonstrated such that anyone viewing the video would understand that the requirements are met. If there are several steps leading up to a final requirement, it would be best to show demonstrate the final requirement(s) than the early ones.
   iii. We don't need you to spend an inordinate amount of time creating these videos, but again, the student should demonstrate to a viewer that she/he has properly completed the lab requirements.
   iv. The file video files should be of type wav or mp4. Find some cloud service on which to store your video. (I suggest YouTube, OneDrive, DropBox, Google Drive, or iCloud.) Put a link in your pre-lab report to your video. Verify that the link works!
7. The student should generally ask the relevant personnel (the course instructor or any of the Peer Instructors) questions regarding a pre-lab *outside* of a lab section, as there shall be no guarantee that a Peer Instructor can attempt to answer question while hosting a lab period. Separately, the student should only ask questions regarding in-lab requirements while attending their lab section, with exception to content related to in-lab procedure specified within a lab document.
8. The student must come to the lab ***prepared***. More specifically,
   i. The student must understand all content related to the relevant pre-lab to the best of their abilities, where Dr. Schwartz and/or any relevant Peer Instructors shall be the pertinent judge(s) of whether or not this requirement is upheld by the student.
   ii. The student must have already submitted their pre-lab report through Canvas at least fifteen minutes before their scheduled lab section (as documented in section 5), and if appropriate, have any required hardware and software constructed. Unless given advance permission by Dr. Schwartz or by a Peer Instructor, the student may **NOT** use another student's hardware for demonstrations.
   iii. Dr. Schwartz and the Peer Instructor reserve the right to rescale a lab that earns less than 50% to a 0 if they believe that sufficient effort was not put into the assignment.
   iv. The student must bring their entire lab kit, a **D**igilent **A**nalog **D**iscovery (**DAD**), a toolbox, and a laptop computer, to all lab sessions. Moreover, there shall be no acceptable excuse for not bringing the aforementioned items; if the

student cannot bring one or more of their own materials, it is their responsibility to find a temporary replacement, as well as alert their Peer Instructor of the situation. Ultimately, Dr. Schwartz and/or the Peer Instructor responsible for the student, have complete authority to decide whether or not a student meets the aforementioned criteria; if the materials brought by the student are deemed unsatisfactory, Dr. Schwartz and/or the Peer Instructor have discretion to either deduct points from the relevant lab grade or to choose not to admit the student into the pertinent lab session.

9. The student must attend labs during their assigned time. If the student arrives more than **twenty minutes** after their lab begins, they will **NOT** be admitted to the lab room. In a ***few rare cases***, labs can be made up; for more information regarding these situations, see the course syllabus.
10. Lab sessions are precisely **115 minutes** long in duration. The student must complete all requirements imposed within the lab session during the aforementioned time allotted.
11. Most labs will have a quiz. Quizzes will be used to assess the student's understanding of material related to the completed pre-lab and any completed lab, and may take as long as an hour (or even 75 minutes). The items permissible for use during a quiz may vary, where the course instructor or Peer Instructor(s) define this set of items. The student is responsible for completing all quizzes given. If the student arrives after their lab begins, they will **NOT** be eligible to take the lab quiz. This means that if you are late for your lab, you will earn a zero on the quiz, which may be worth up to 40% of the lab points. (So be sure to be at your lab early!)
12. A student who does not attend their lab (or is more than twenty minute late for their lab), will earn a zero on their lab **even if they submitted the pre-lab report**.
13. **A weighted lab average of at least 65% must be achieved by the student in order for the student to be eligible to pass the course.**
14. It is the responsibility of the student to return all equipment and clean any pertinent work areas before leaving the lab. Failure to do so will result in at least a ten-point deduction from the relevant lab grade.
15. If the student is to perform any hardware construction with any equipment not provided within the lab, it is the responsibility of the student to verify with either the Dr. Schwartz or their Peer Instructor that the chosen equipment is appropriate.
16. In the event of a broken part, it is the student's responsibility to find an equivalent part. You should consult with your Peer Instructor and/or Dr. Schwartz to find the proper parts.
17. The student is **not** allowed to use any pre-built devices where the intention is to have you design them yourself.
18. It is **required** that the student read this entire document before submitting any pre-lab assignment and before attending any lab session. Failure to follow or correctly understand any of the above rules and policies may result in a point deduction of any amount from a lab grade, where this point deduction may be determined by either the course instructor or any Peer Instructor(s) deemed qualified by the course instructor.

In the Homework 0 Quiz you will acknowledge and affirm that you have read and understood these *Lab Rules & Policies*, and that you agree to abide by all lab rules, policies, and guidelines set forth within the document (and also those specified in the syllabus, the slack rules, and the *Lab Submission Template*).