San José State University Department of Electrical Engineering  
EE178-01, Digital Design with FPGAs, Fall 2019 (v1.0)

Course and Contact Information

Instructor: Christopher Pham
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Email: Christopher.h.pham01@sjsu.edu
Office Days/Time: TR after class hours or upon arrangement
Class Days/Time: TR 19:30 – 20:45
Classroom: Engineering Building 345

Prerequisites: EE118 (with grade C or better)

Course Format

This course is a technology intensive course which requires access to specified hardware and software for completion of assignments. Additionally, mobile internet connectivity is required. Continued enrollment in this course signifies student understanding and acceptance of the required texts and materials.

Course Web Page and Messaging

Course materials such as syllabus, handouts, and assignments are on the Canvas Learning Management System which is accessible from https://one.sjsu.edu. Students are responsible for regularly checking Canvas to learn of any updates. Students are responsible to ensure a valid email address is on file with MySJSU and to monitor communications sent through MySJSU. The instructor phone is provided for urgent or private matters only.

Course Description

This course will expose students to digital design with programmable logic devices using Verilog-HDL. Additionally, students will learn about field programmable devices, synthesis and simulation, and additional topics applicable to synchronous systems.

Course Goal and Learning Outcomes

The course goal is to provide a background, at an intermediate level, of a digital circuit design flow including capture in Verilog-HDL, synthesis, implementation, and hardware validation. Students will gain experience in application of a state-of-the-art CAD tool and field programmable devices to implement functionally correct designs meeting performance requirements. ABET compliant course learning outcomes include:

- The ability to understand and apply a hardware description language to capture design behavior and use that same hardware description language to exercise the captured design to evaluate its behavior. [ABET Student Outcome 1]
- The ability to use CAD software, tools, and instruments as part of a design flow to render digital circuits which meet their functional and performance specifications. [ABET Student Outcome 2]
The ability to recognize design aspects that can affect reliability and make informed judgments given potential impacts to environmental, safety, economic, and legal contexts. [ABET Student Outcome 4]

The ability to work in a group. Related, the ability to collaborate to prepare and present technical documentation of results at appropriate levels of detail for the target audiences. [ABET Student Outcomes 3 and 5]

The ability to understand major selection criteria for implementation technologies and identify compelling advantages of field programmable devices. [ABET Student Outcome 7]

Required Texts and Materials

Required Textbook
There is no required textbook. The instructor will provide all required reading material through Canvas.

Required Materials
- Real Digital Blackboard from https://www.realdigital.org (~$175, delivered, academic pricing)
- Laptop PC with Microsoft Windows 10 (64-bit) and a USB port

Other References
A textbook from EE118 (or equivalent) serves as a fundamental reference for digital logic design principles.

Course Requirements, Assignments, Grading, and Related Policies

Requirements
Success in this course is based on the expectation that students will spend, for this 3-unit course, a minimum of 135 hours over the length of the course (normally 9 hours per week) for instruction, preparation and studying, and course related activities, including but not limited to labs and projects. Please refer to the course schedule for dates and times of labs, quizzes, exams, and presentations. University policy requires an appropriate final examination or evaluation at the scheduled time in every course. In this course, the final evaluation consists of the final lab project and an associated presentation, a team-based activity.

Assignments
Lab Exercises: Four, at 8% each: 32% total
Lab Exercise Quizzes: Four, at 3% each: 12% total
Lab Projects: Four, at 8% each: 32% total
- No late or missed work will be accepted.

Examination and Evaluation
Concept Exams: Two, at 8% each: 16% total
Presentation: One, at 8% each: 8% total
- No late or missed presentation will be accepted.

Determination of Grades
A plus \( \geq 97 \)   A \( \geq 93, < 97 \)   A minus \( \geq 90, < 97 \)
B plus \( \geq 87, < 90 \)   B \( \geq 83, < 87 \)   B minus \( \geq 80, < 83 \)
C plus \( \geq 77, < 80 \)   C \( \geq 73, < 77 \)   C minus \( \geq 70, < 73 \)
D plus \( \geq 67, < 70 \)   D \( \geq 63, < 67 \)   D minus \( \geq 60, < 63 \)
F \( < 60 \)
Classroom Protocol

As a graduating elective course, this class resembles the enterprise level working environment. Ethics and professionalism in the workplace will be enforced.

University Policies

University Policies (Required)

Per University Policy S16-9 (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs’ Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/”. Make sure to visit this page, review and be familiar with these university policies and resources.

Related Policies

To support ABET accreditation, and deter violations of academic integrity and the honor code, the instructor keeps a copy of all submitted evaluation instruments of all students for at least two years. Late work without advanced agreement with the instructor is not accepted and receives zero credit. No extra credit assignments are given. All students have the right, within a reasonable time, to know their academic scores, to review their graded work, and to be provided with explanations for the determination of their course grades. Students may request a score summary by contacting the instructor. The incomplete “I” grade is reserved for unforeseeable, serious, and compelling reasons only.

Course Policies

Use common sense during lectures and office hours. Show respect for all members of the class. If unsure something is allowed, ask. Recording lectures in any format is prohibited. Posted office hours are the 15 minutes following the official meeting time. It is the instructor’s policy to answer all questions brought by students, so office hours may run substantially longer. To prevent abuse of the “no question left unanswered” policy, students must arrive in the officially scheduled 15 minutes and add their name to the waiting list. Please advise the instructor promptly of schedule or transportation constraints which may require re-prioritization of the waiting list.

Professional Attitude

In addition to the honor code, students understand that a professional attitude is necessary to maintain a comfortable academic environment. As examples:

- Do not skip the lecture and then later ask the instructor to summarize the lecture
- Come to the lectures on time and remain for the entire duration of the session
- To minimize possible tension during exams, follow the exam rules closely

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/home/catalog.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student
contact the Department Chair as a next step.

**Dropping and Adding**

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s Catalog Policies section at [http://info.sjsu.edu/static/catalog/policies.html](http://info.sjsu.edu/static/catalog/policies.html). Add/drop deadlines can be found on the current academic calendar web page located at [http://www.sjsu.edu/calendars/](http://www.sjsu.edu/calendars/). The Late Drop Policy is available at [http://www.sjsu.edu/aars/policies/latedrops/policy/](http://www.sjsu.edu/aars/policies/latedrops/policy/). Students should be aware of the current deadlines and penalties for dropping classes. Information about the latest changes and news is available at the Advising Hub at [http://www.sjsu.edu/advising/](http://www.sjsu.edu/advising/).

**Consent for Recording of Class and Public Sharing of Instructor Material**

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), requires students to obtain instructor’s permission to record the course and the following items to be included in the syllabus:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor’s permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
  - It is suggested that the greensheet include the instructor’s process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
  - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

**Academic integrity**

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University’s Academic Integrity policy, located at [http://www.sjsu.edu/senate/policies/pol_plagarism_acad_integrity/index.html](http://www.sjsu.edu/senate/policies/pol_plagarism_acad_integrity/index.html), requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at [http://www.sjsu.edu/studentconduct/](http://www.sjsu.edu/studentconduct/).

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy S07-2 requires approval of instructors.

**Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at [http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at [http://www.sjsu.edu/aec/](http://www.sjsu.edu/aec/) to establish a record of their disability.
EE Honor Code - Honesty and Respect for Others and Public Property

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

− Take an exam in place of someone else, or have someone take an exam in my place
− Give information or receive information from another person during an exam
− Copy project information from others
− Use more reference material during an exam than is allowed by the instructor
− Obtain a copy of an exam prior to the time it is given
− Alter an exam after it has been graded and then return it to the instructor for re-grading
− Leave the exam room without returning the exam to the instructor.”

Measures Dealing with Occurrences of Cheating

− Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University.
− A student’s second offense in any course will result in a Department recommendation of suspension from the University.
### EE178, Digital Design with FPGAs, Fall 2019, Course Schedule

The course schedule is subject to change with fair notice. If a change is necessary, it will be communicated via messaging through MySJSU and/or classroom announcements.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Assignments, Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thursday</td>
<td>First day of instruction Lab 0 Exercise Assigned</td>
</tr>
<tr>
<td>2</td>
<td>8/27 &amp; 8/29</td>
<td>Lab 0 Exercise Due, Lab 1 Exercise Assigned</td>
</tr>
<tr>
<td>3</td>
<td>9/3 &amp; 9/5</td>
<td>Lab 1 Exercise Due, Lab 1 Quiz, Lab 2 Project Assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reminder: 9/3: Last day to drop courses without an entry on student’s permanent record (D)</td>
</tr>
<tr>
<td>4</td>
<td>9/10 &amp; 9/12</td>
<td>Lab 2 Project Due, Lab 3 Exercise Assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reminder: Last day to add courses &amp; register late</td>
</tr>
<tr>
<td>5</td>
<td>9/17 &amp; 9/19</td>
<td>Lab 3 Exercise Due, Lab 3 Quiz, Concept Exam 1 Prep</td>
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<tr>
<td>6</td>
<td>9/24</td>
<td>Concept Exam 1 [In Class]</td>
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<tr>
<td></td>
<td>9/26</td>
<td>Lab 4 Project Assigned</td>
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<tr>
<td>7</td>
<td>10/1 &amp; 10/3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10/8 &amp; 10/10</td>
<td>Lab 4 Project Due, Lab 5 Exercise Assigned</td>
</tr>
<tr>
<td>9</td>
<td>10/15 &amp; 10/17</td>
<td>Lab 5 Exercise Due, Lab 5 Quiz, Lab 6 Project Assigned</td>
</tr>
<tr>
<td>10</td>
<td>10/22 &amp; 10/24</td>
<td></td>
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<tr>
<td>11</td>
<td>10/29 &amp; 10/31</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>11/5 &amp; 11/7</td>
<td>Lab 6 Project Due, Concept Exam 2 Prep</td>
</tr>
<tr>
<td>13</td>
<td>11/12</td>
<td>Concept Exam 2 [In Class]</td>
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<tr>
<td></td>
<td>11/14</td>
<td>Lab 7 Exercise Assigned</td>
</tr>
<tr>
<td>14</td>
<td>11/19 &amp; 11/21</td>
<td>Lab 7 Exercise Due, Lab 7 Quiz, Lab 8 Project Assigned</td>
</tr>
<tr>
<td>15</td>
<td>11/26</td>
<td>Thanksgiving holiday week (11/27 – 11/29)</td>
</tr>
<tr>
<td>16</td>
<td>12/3 &amp; 12/5</td>
<td>Presentation Prep, Show-and-Tell or Guest Speaker</td>
</tr>
<tr>
<td>17</td>
<td>12/10 – 12/16</td>
<td>No Class – Conference Day – Final Exam Week</td>
</tr>
<tr>
<td></td>
<td>Tuesday, 12/17/2019</td>
<td>Lab 8 Project &amp; Presentation, in Classroom, 19:45 to 22:00</td>
</tr>
</tbody>
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**FINAL EXAM SCHEDULE - FALL 2019**

[http://info.sjsu.edu/static/catalog/final-exam-schedule-fall.html](http://info.sjsu.edu/static/catalog/final-exam-schedule-fall.html)
**NIGHT CLASSES**

Late afternoon and night classes meeting more than once per week should schedule their final exam on the earliest possible date. Example: final exam for ENGL 001A which meets on MWF from 18:30-19:45 should be scheduled on Wednesday, December 11 from 19:45-22:00 (not Monday, December 16).

<table>
<thead>
<tr>
<th>Regular Class Start Time</th>
<th>Final Examination Day</th>
<th>Final Examination Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday Night (1830 or later)</td>
<td>Monday, December 16</td>
<td>19:45-2200</td>
</tr>
<tr>
<td>Tuesday Night (1830 or later)</td>
<td>Tuesday, December 17</td>
<td>19:45-2200</td>
</tr>
<tr>
<td>Wednesday Night (1830 or later)</td>
<td>Wednesday, December 11</td>
<td>19:45-2200</td>
</tr>
<tr>
<td>Thursday Night (1830 or later)</td>
<td>Thursday, December 12</td>
<td>19:45-2200</td>
</tr>
<tr>
<td>Friday Night (1830 or later)</td>
<td>Friday, December 13</td>
<td>19:45-2200</td>
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</tbody>
</table>