1. Course Name and Number
Digital Engineering Laboratory (ECE 554 001; Fall 2018-2019 [1192])

2. Credits and contact
4 credits; 105 contact hours including 90 laboratory hours

3. Canvas Course URL
https://canvas.wisc.edu/courses/108106

4. Course Designations and Attributes
None

5. Meeting Time and Location

Engineering Hall 2540 W 12:05 PM-12:55 PM
Engineering Hall 3634 TR 3:45 PM-6:45 PM

6. Indicate whether the course is required, elective, or selected elective

Elective

7. Instructional Mode
Classroom instruction.

8. Specify How Credit Hours Are Met by the Course
***45 Hours Per Credit** – The credit standard for this course is met by an expectation of a total of 180 hours of student engagement with the courses learning activities, which include 50-minute class period once a week and 3 hours of laboratory time twice a week, and student project work as described in the syllabus. Students are expected to work on course learning activities (reading, writing, project planning, design, hardware and software implementation, etc.) for about 5 hours per week outside of classroom.*

9 INSTRUCTORS AND TEACHING ASSISTANTS
9.1 Instructor Title and Name

- *Professor Parmesh Ramanathan (parmesh.ramanathan@ece.wisc.edu)*
- *Assistant Professor Bhuvana Krishnaswamy (bhuvana@ece.wisc.edu)*

9.2 Instructor Availability

Instructor will be available for face-to-face interaction during the 50-minute class period every week. The instructor and the teaching assistants will also be interacting one-on-one with each student team during the 6 hours of laboratory period every week. During the laboratory periods, each student (as part of their team) will be expected to participate along with instructor and teaching assistants in project

related discussions (project proposal, architecture review, organization review, progress milestones, project demonstrations, etc.).

9.3 Instructor Email/Preferred Contact

- *Professor Parmesh Ramanathan (parmesh.ramanathan@ece.wisc.edu)*
- *Assistant Professor Bhuvana Krishnaswamy (bhuvana@ece.wisc.edu)*

9.4 Teaching Assistant

- *Di Wu (di.wu@ece.wisc.edu)*

9.5 TA Office Hours

Teaching assistant will be available for one-on-one discussion during the laboratory hours. The teaching assistant may also answer students questions via email.

9.6 TA Email/Preferred Contact
- *Di Wu (di.wu@ece.wisc.edu)*

10 OFFICIAL COURSE DESCRIPTION
Course Description
Practical aspects of computer system design. Design, construction, and testing of significant digital subsystems. Design, construction, and programming of pipelined digital computers. Enroll info: ECE/Comp Sci 252; ECE/Comp Sci 552.

11. Requisites
None.

12 LEARNING OUTCOMES
12.1 Course Learning Outcomes
- *Students will be able to deal with problems and solutions associated with many aspects of development and project management*
- *Work effectively as a member of a moderate-sized team*
- *Use contemporary digital hardware development tools; design, test, and demonstrate a complex digital system.*

12.2 ABET STUDENT OUTCOMES
- *(a) an ability to apply knowledge of mathematics, science, and engineering*
- *(b) an ability to design and conduct experiments, as well as to analyze and interpret data*
- *(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability*
- *(d) an ability to function on multidisciplinary teams*
- *(e) an ability to identify, formulate, and solve engineering problems*
- *(g) an ability to communicate effectively*
- *(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.*

13 BRIEF LIST OF TOPICS TO BE COVERED
Material covered in this course includes FPGA (field-programmable gate array) concepts and design, design of register files and memory, pipelined design, instruction set design, basic project management, and working in teams.

14 DISCUSSION SESSIONS
Not applicable.

15 LABORATORY SESSIONS
Design and implement a processor-based architecture using field-programmable gate array.

16 REQUIRED TEXTBOOK, SOFTWARE & OTHER COURSE MATERIALS
Handouts, materials, and online manual

GRADING

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK
- Miniprojects (20%)
- Reviews and documents (15%)
- Project (65%): *The project is to design, implement, test, and program a general or special purpose digital computer that emphasizes one or mere particular features. Projects typically also include significant software development and demonstrations using the capabilities of the FPGA boards provided in class. Project groups are four to five in size.*

HOMEWORK & OTHER ASSIGNMENTS
None.

ACADEMIC INTEGRITY
By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to https://conduct.students.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty

[me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/