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Course Description:
Introduction to digital systems and binary codes; Boolean algebra and digital logic devices; combinational logic circuits and design methods; sequential logic circuits and design methods; ROM and RAM memory elements; the Verilog Hardware Description Language (HDL). Laboratory experience includes logic circuits, modern Electronic Design Automation (EDA) tools, and Field Programmable Gate Array (FPGA) hardware.

Objectives: By the end of the course, students should be able to:
- Interpret basic logical functions from digital circuits.
- Implement basic logic functions in digital circuits.
- Explain the physical implementation of modern digital circuits.
- Execute optimization techniques for various digital circuits.
- Perform digital arithmetic computations.
- Construct digital circuits using standard digital design blocks.
- Differentiate synchronous and asynchronous systems.
- Interpret schematic representations of digital systems.
- Construct synchronous digital systems.
- Design finite-state-machines.
- Design a substantial digital system using a modern FPGA.
- Be able to understand the design of an 8-bit microcontroller representative of modern RISC machines.
- Be able to create simple assembly programs for digital systems, controlling interrupts, I/O, and memory access.

Required Texts:

Assignments:
Assignments are due at the beginning of the designated class period and must be handed in individually; no late assignments are accepted and assignments will not be accepted from another classmate’s hand. Assignments that are not turned in count double for the purpose of calculating grades. Prior approval or unforeseen emergencies may, at the instructor’s discretion, be considered as acceptable reasons for late assignments.
Homeworks and Quizzes:
Homework assignments will be given along with solutions. Students are encouraged to attempt the problems before looking at the provided solutions. Quiz questions will also be provided that test comprehension of the assigned readings and lecture. At the beginning of each class period, students will take a short quiz generally consisting of one of the homework problems and five of the quiz questions.

Course Web Page:
http://engr.georgefox.edu/ENG220

Course E-mail list:
This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, and the instructor. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com.
Find our class page at: http://piazza.com/georgefox/fall2018/enge220

Lab Experiments:
The lab experience will consist of approximately 12 laboratories. Some laboratories require a pre-lab to be completed before the student comes to lab. **Failure to complete the pre-lab will result in a reduction of ½ of the points from the total lab for the overall score of the lab in question.** Any lab that is not completed by the end of the lab must be completed before the beginning of the next lab. It is the student’s responsibility to secure time to make up the lab. **Failure to complete a given lab and turn in the appropriate materials will result in a full letter-grade reduction in the overall course grade. Do not ignore labs.**

Design Project:
A comprehensive design project will be due on the last day of class.

Portfolio requirement:
Students will work with their faculty advisor to curate and refine their portfolios as they progress through the program. Students shall ensure that all portfolio entries are appropriate for public disclosure (i.e., they do not reveal key components of assignment solutions to current or future students).
Exam Schedule:
Exam 0 Mon, Sep. 17
Exam 1 Mon., Oct 8
Exam 2 Mon., Nov. 5
Exam 3 Fri, Nov. 30
Final Exam ??

Passing the course:
In order to pass the course, students must achieve an average of 65.00% on the four exams and the final. This can be computed in one of two ways:

1) Normal weighting for each test and double weight for the final (125,125,125,125,300).
   This system allows a student to do poorly on any given test and still have a chance at the 65% average.

2) Scaled system where the value of each test doubles throughout the semester (100,200,400,800,1600).
   This system allows a student who does poorly at the beginning of the semester to demonstrate mastery of the material at the end of the semester.

Students who fail to achieve the 65.00% average will not pass the course. Achieving the 65.00% average on the exams does not guarantee that the student will pass the course – all other class assignments will be used in the calculation of the final grade.

Grading:
If a student has achieved the 65.00% on the exam grades, the course grade will be based on the following point system.

Assignments that are not turned in on will count double towards the cumulative average (a 10 point assignment that is not turned in will net the student 0 out of 20 points).

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<th>Points</th>
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Engineering Your Soul:

The third mission objective of the George Fox University Engineering program states:

GFU Engineers will understand responsible service from a Christian worldview that emphasizes integrity in every aspect of this service, motivates individuals to a life of responsible service to humankind, and recognizes the need for a life of continued learning.

As one step towards the fulfillment of this objective, the engineering faculty is excited to present another Engineering Your Soul reading. Each semester, we collectively identify an influential Christian writing to be read and reflected upon by all engineering faculty and students throughout the term.

There is a EYS schedule for the readings as well as for 4 meetings that will take place during the semester.

In order to obtain full credit for the EYS portion of the class, you must achieve 8 credits during the semester. Each reading reflection, meeting attendance, meeting response (original or a follow-up), rewards you with 1 credit. You can earn up to 3 credits for each reading/meeting cycle.

An EYS Piazza “course” has been setup, http://piazza.com/georgefox/fall2018/ey, where all students can submit reflections and responses. To receive credit for a reflection,…

- Reading reflections must be submitted by 11:59 pm on Sunday, the day before the meeting.
- Meeting reflections must be posted by 11:59 pm on the Wednesday following the meeting.
- Tag your post with both (a) the class you attend, (b) the appropriate reading/meeting folder.
- Each reflection should be 1-2 paragraphs.
- Remember, the intent is for you to share your personal thoughts on the reading/meeting material. What most struck you and why? These should NOT simply be summaries of the reading or meeting content.
- Do not post anonymously because a search will not pick up your name. If you would prefer to remain anonymous, send a private note to your instructor in Piazza, and we’ll post it for you.

Disability Services Information

If you have specific physical, psychiatric, or learning disabilities and require accommodations, please contact the Disability Services Office as early as possible so that your learning needs may be appropriately met. You will need to provide current documentation of your disability to Disability Services. For more information, contact Rick Muthiah, Director of Disability Services (ext. 2314 or rmuthiah@georgefox.edu), or go to ds.georgefox.edu for more information.

Academic Resource Center

The Academic Resource Center (ARC) on the Newberg campus provides all students with free writing consultation, academic coaching, and learning strategies (e.g., techniques to improve reading, note-taking, study, time management). The ARC, housed on the second floor of the Murdock Learning Resources Center (library), is open from 1:00-10:00 p.m., Monday through Thursday, and 12:00-4:00 p.m. on Friday. Call 503-554-2327 or email the_arc@georgefox.edu to schedule an appointment. Visit arc.georgefox.edu for information about ARC Consultants’ areas of study, instructions for scheduling an appointment, and helpful learning tools.