New Paltz
STATE UNIVERSITY OF NEW YORK
Division of Engineering Programs

EGC221 Digital Lab
(1 credits*)
Spring 2020 Semester

Instructor: Dr. Baback Izadi, 213 Resnick Engineering Hall
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http://www.engr.newpaltz.edu/~bai

Course web page: http://www.engr.newpaltz.edu/~bai/EGC221/EGC221_spring.html
Lab Session: **Wednesday** 11:00 AM -1:50 PM WH221
Office Hours: Monday and Thursday 11:00 AM – 12:30 PM
Wednesday 10:00 AM – 11:00 AM
In person or via skype: baback.izadi
And by appointment

Corequisites: EGC220 Digital Logic Fundamentals

Course catalog description: Experiments in both combinational and sequential logic design. Breadboarding, schematic capture, and Verilog implementation of digital circuits of varying complexity. Use of software tools such as Altera Quartus II to design FPGA based circuits.

Course learning outcomes:

I. Students will learn to analyze, design, simulate, and build combinational logic and clocked sequential circuits using modern computer engineering tools and techniques.

II. Students will work in teams to carry out the lab projects and make an oral presentation at the end of the semester.

This course contributes to the student outcomes as specified in the following table:

Student Outcome	Learning Outcome	Level of Contribution 3 /3 = strong; 2/3 = moderate; 1/3 = marginal
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	I	2/3
3) an ability to communicate effectively with a range of audiences	II	1/3

**Credit hours assigned reflect both classroom instruction time and expected outside preparation/study time and must comply with SUNY's credit hour policy. Verification of compliance is a component of Middle States' reaccreditation review.*

Textbook:
No textbook is required for this course.

References:

- *"Digital Design",* 5th Edition, Mano/Ciletti, Prentice Hall, Upper Saddle River, NJ , 2013, ISBN 978-0-13-277420-8
- *"Logic and Computer Design Fundamentals,"* 4th Edition, by M. Mano and C. Kime, Prentice Hall, Upper Saddle River, NJ, 2008
- "*Fundamentals of Logic Design*", by C. H. Roth, Jr, PWS Publishing Company.
- "*Digital Design and Computer Architecture*," David Money Harris and Sarah Harris, Morgan Kaufmann Publ, 2007
- *"Digital Design"* 3rd Edition by J. F. Wakerly, Prentice Hall, Upper Saddle River, NJ, 2000.
- "*Digital Principles,*" 3rd Ed, Roger L. Tokheim, Schaum's Outline Series, McGraw-Hill Publ, 1994 [contains many worked out examples]
- "*Introduction to Digital Systems*", by Palmer and Perlman, Schaum's Outline Series, McGraw-Hill, New York, 1993 [contains many worked out examples].

Assignments:
Assignments will be posted on the course web site:
http://www.engr.newpaltz.edu/~bai/EGC221/EGC221_spring.html
The students should review the lab prior to the scheduled lab period and be prepared for the lab. A brief overview of the lab experiment will be given at the beginning of each new lab session. Tentative lab schedules are as follows:

Lab number	**Title**
1	Basic Logic Gate Simulation (Word) (PDF)
2	Basic Logic Gate Physical Verification (Word) (PDF)
3	Combinational Logic Circuits (Word) (PDF)
4	Combinational Logic Circuit Reduction (Word) (PDF)
5	Arithmetic Circuits Using Altera Quartus II (Word) (PDF)
6	Hierarchical Logic Design Using Altera Quartus II (Word) (PDF)
7	Arithmetic Logic Unit (ALU) Schematic Implementation (Word) (PDF)
8	Arithmetic Logic Unit (ALU) Verilog Implementation (Word) (PDF)
9	Sequential Design Using Verilog (Word) (PDF)

Design Team:
Teams of two students will complete each lab as a unit. Team members must be active in all phases of the lab. Inactive team member can be removed at the discretion of other team member or the instructor. Inactivity of team members should be brought to the attention of the instructor. Each team is to turn in one lab report at the beginning of the next lab session.

Grading Policy:

Category	Weight
Lab reports	**80%**
End of semester oral presentation	**10%**
Attendance and participation	**10%**
Total	**100%**

Each lab report is graded on a 0-10 point scale. A report without a signature is graded on a 0-5 point scale.

Presentation:
Each team is expected to make a Power Point presentation of 10 to 15 minutes on the last day of lab. You may consult with me and choose one the labs. Your presentation should include your design problem and your solution at the appropriate detail. You should conclude with encountered problems and lesson learned.

Relevant Web Sites:

- Digital Logic Fundamentals: http://www.williamson-labs.com/480_logic.htm
- Digital logic tutorial: http://www.play-hookey.com/digital/
- Combinational Logic Tutorial: http://www.ee.surrey.ac.uk/Projects/Labview/combindex.html
- Latches and Flip flops: http://vorlon.cwru.edu/~jackie/eces301/hw/HW2/lab2.html
- Texas Instruments Digital Logic Families: http://focus.ti.com/docs/logic/logichomepage.jhtml
- To download a demo version of LogiSim click on https://sourceforge.net/projects/circuit/

Rules and general comments:

- Attendance policy: I strongly advise against missing any labs. If you miss a lab, it is your responsibility to obtain assignments and other information given on that day. You will not be penalized for the first missed lab. However, each additional missed lab will result in loss of 5% of the overall grade up to a total of 15%.
- Common courtesy is expected in class. Please turn off your cell phone or put it on

silent mode while in class.

- Please make sure you save your graded labs. I may ask for them in case of any grading discrepancy.
- "I" indicates that the student has done satisfactory work in the course, but because of circumstances beyond his control has been unable to finish all requirements. It is not to be given to enable a student to do additional work to bring up a deficient grade.

Campus-wide Policy Statements

1. Academic integrity policy statement: Students are expected to maintain the highest standards of honesty in their college work. Cheating, forgery, and plagiarism are serious violations of academic integrity. Students found guilty of any violation of academic integrity are subject to disciplinary action, up to and including expulsion. New Paltz's policy on academic integrity (rev. October 2017) is found in the Undergraduate Catalog. Sojourner Truth Library's website contains several excellent resources to help with avoiding plagiarism; see especially lib.newpaltz.edu/assistance/plag.html.

- ✓ All your coursework (homework, project, and exams) is expected to be your own. If you are caught cheating on any assignment, you will get an "F" for the course and you will be reported to the university. General instructions such as assisting in problem interpretation, and giving of occasional hints on problem attack (i.e., the kind of help you would get from the instructor or a teaching assistant in the course!), however, are permitted.
- ✓ During the exam, you may not borrow any item from your classmates i.e. calculator, pens, erasers. Moreover, you may not talk with your classmates. Doing so can result in a failed grade for the exam or the course.

2. Reasonable accommodation of individuals with disabilities statement: Students needing classroom and/or testing accommodations related to a disability should contact the Disability Resource Center (Student Union, Room 210, 845-257-3020) as close as possible to the beginning of the semester. The DRC will then provide students' instructors with an Accommodation Memo verifying the need for accommodations. Specific questions about services and accommodations may be directed to Deanna Knapp, Assistant Director (knappd@newpaltz.edu) or Jean Vizvary, Director (vizvaryj@newpaltz.edu).

3. Veteran & Military Services statement: New Paltz's Office of Veteran & Military Services (OVMS) is committed to serving the needs of veterans, service members and their dependents during their transition from military life to student life. Student veterans, service members or their dependents who need assistance while attending SUNY New Paltz may refer to OVMS's website; call 845-257-3120, -3124 or -3074; e-mail np-vms@newpaltz.edu; or stop by the Student Union, Room 100 South.

4. Computer and network policies statement: Users of New Paltz's computer resources and network facilities are required to comply with the institutional policies outlined in the Acceptable Uses and Privacy Policy and other technology policies, available at www.newpaltz.edu/itpolicy.

5. Identity verification policy statement for online courses: New Paltz's Online Identity Verification Policy is designed to verify that students enrolled in our online

courses and/or programs are the ones who take the courses, complete the programs, and receive the academic credit. The complete policy is published in the Undergraduate Catalog.

6. Title IX and related policy statement: Gender discrimination, sexual harassment, sexual assault, sexual violence, stalking, and power-imbalanced sexual/romantic relationships between faculty and students are strictly prohibited within the SUNY New Paltz community. We encourage students to report, confidentially discuss, or raise questions and concerns regarding potential violations. Reports can be made to the Title IX Office, the department chair and/or the dean of your school. For information on Title IX reporting and support, visit www.newpaltz.edu/titleix/. The College's Consensual Relationship Policy can be found at www.newpaltz.edu/hr/policies.html.

Special dates:

March 10	Mid-Point of Spring 2020 semester
March 16- March 20	Spring Break – No classes
March 24	**Thursday classes meet.** Tuesday classes **do not** meet this day.
March 30	Last day to withdraw from the course
April 8 (3PM) - 10	Passover No Classes
April 15	**Friday classes meet.** Wednesday classes **do not** meet this day
April 27 – May 1	SEI administration
May 6	Oral Presentation, Last day of classes for Spring 2020
May 7	Study Day
May 8	Common Exam Day