



Division of Engineering Programs
EGC220 Digital Logic Fundamentals
(3 credits*)
Spring 2020 Semester

Instructor: Dr. Baback Izadi, 213 Resnick Engineering Hall
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Course web page: http://www.engr.newpaltz.edu/~bai/EGC220/EGC220_spring.html
Lecture: Monday and Thursday 9:30 AM – 10:45 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

Prerequisites: MAT251 Calculus I
Corequisites: EGC221 Digital Logic Lab

Course catalog description: An introduction to digital logic analysis and design. Topics include: number representations used in today's digital systems and their arithmetic properties and conversion techniques; combinational switching theory of digital element networks where no feedback is present; analysis and design of clocked sequential circuits where feedback is present; and an introduction to modern programmable logic devices and their programming and synthesis techniques.

Course learning outcomes:

- I. Students will learn to demonstrate their ability to analyze, synthesize, and design networks of combinatorial digital logic elements, and digital clocked sequential circuits.

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	3/3

Course Structure:

**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.*

The course is in hybrid format. Before coming to each lecture, you are required to watch the assigned lecture videos in Blackboard and do the assigned problems. During the lecture, we will discuss issues and answer questions. At the end of the lectures, you will take a short quiz.

Textbook:

"*Digital Design*," online textbook by ZyBooks (all students enrolled in the class has access to it and will be used partially for assignments). The cost to subscribe is \$48 and it will be valid through 5/7/2020. To get access:

1. Sign up at zyBooks.com
2. Enter zyBook code **NEWPALTZEGC220IzadiSpring2020**
3. Click Subscribe

References:

- ◆ "*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].

Grading:

ZyBook assignment	40 Points
Homework	60 Points
Quizes	200 Points
2-tests	200 Points
Final	100 Points
Total	600 Points

The table to the right indicates the maximum points for the indicated grade. Some adjustment will likely be made depending on the class average.

Total Point	Final Grade
540-600	A
528-539	A-
511-527	B+
480 – 510	B
465-479	B-
449-464	C+
420-448	C
406-419	C-
360 – 405	D
Below 360	F

The lowest 5 quiz grades will be dropped. This includes any missed quiz for legitimate absences. Hence, there will not be any make up quiz.

Course Content:

Lecture Date	Lecture Note	Lecture Video on <i>Blackboard</i>	Additional Activity
1/23/2020	Overview & Class policy		
1/27/2020	1-Number systems	Lectures 1 & 2	Read text Chapter 1, Try Problems 1
1/30/2020	1-Number systems	Lectures 3 & 4	Read text Chapter 1, Try Problems 2
2/3/2020	1-Number systems	Lectures 5 & 6	Read text Chapter 1, Try Problems 3
2/6/2020	2 - Boolean Logic	Lectures 7 & 8	Read text Chapter 2, see sample operations , Try Problem 4
2/10/2020	3 - Boolean Logic Functions	Lectures 9 & 10	Read text Chapter 2, Try Problem 5
2/13/2020	3 - Boolean Logic Functions	Lectures 11 & 12	Read text Chapter 2, Try Problem 6
2/17/2020	3 – All NAND Implementation	Lectures 13 & 14	Read text Chapter 2, Try Problem 7
2/20/2020	4-Simplification Using K-Map	Lectures 15 & 16	Read Text Chapter 3, Try Problem 8
2/24/2020	4-Simplification Using K-Map	Lectures 17 & 18	Read Text Chapter 3, Try Problem 9
2/27/2020	5-Design of Combinational Circuits	Lectures 19 & 20	Read Text Chapter 3, Try Problem 10
3/2/2020	Test 1		Practice Problems
3/5/2020	5-Design of Combinational Circuits	Lectures 21 & 22	Read Text Chapter 3, Try Problem 11
3/9/2020	Design of Decoders	Lectures 23 & 24	Read Text Chapter 3, Try Problem 12
3/12/2020	Design of Encoder / Mux/ DeMux	Lectures 25 & 26	Read Text Chapter 3, Try Problem 13
3/23/2020	6- Programmable Logic Devices	Lectures 27 & 28	Try Problem 14
3/24/2020	7- Design Using Verilog	Lectures 29 & 30	Read Text Chapter 4, Try Problem 15
3/26/2020	7- Design Using Verilog 8- Latches	Lectures 31 & 32	Read Text Chapter 5, Try Problem 16
3/30/2020	8- Flip-flops and Ripple Counters	Lectures 33 & 34	Read text Chapter 5 & Try Problem 17
4/2/2020	8- Asynchronous and Synchronous Circuits	Lectures 35 & 36	Read text Chapter 5 & Try Problem 18
4/6/2020	8- Analysis of Sequential Circuits	Lectures 37 & 38	Read text Chapter 5 & Try Problem 19
4/13/2020	Test 2		Practice Problems
4/16/2020	8- Design of Sequential Circuits	Lectures 39 & 40	Read Text Chapter 5, Try Problem 20
4/20/2020	8- Sequential Circuits		Read Text Chapter 5, Try Problem 20
4/23/2020	8- Verilog in Sequential Circuits	Lectures 41 & 42	Read Text Chapter 5, Try Problem 21
4/27/2020	8- Design of Finite State Machine	Lectures 43 & 44	Try Problem 22
4/30/2020	8- Design of a Controller	Lectures 45	Read Text Chapter 5, Try Problem 23
5/4/2020	Review		

5/11/2020	Final Exam	10:15 AM – 12:15 PM
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***Exam Dates are tentative**

Rules and general comments:

- ◆ Each examination and its format will be announced one week prior. Should an exam schedule conflict occur, you should bring it to the instructor's attention as soon as possible? Once you begin an exam, no makeup or other score adjustments will be permitted. Please note the date and time of the final exam and do not schedule any event that will not permit you to take the final at that time.
- ◆ Homework assignments will be posted on the course web site. The due date is one week from the distribution date (unless otherwise specified). No late homework set is accepted except under extreme non-academic condition and with the prior approval of the instructor.
- ◆ I strongly advise against missing any classes. If you miss a class, it is your responsibility to obtain assignments and other information given on that day. Attendance will be taken during the first 10 minutes. After that you are considered absent. Three missing classes are allowed. You would lose 2% of your grade if you miss a fourth class and 5% after the seventh absence.
- ◆ Common courtesy is expected in class. Please turn off your cell phone or put it on silent mode while in class.
- ◆ All your coursework (homework, project, and exams) is expected to be your own – See **Academic integrity policy statement** below.
- ◆ Please seek help before serious difficulties in your understanding of course material arise. In particular, it is much better to get your questions answered before an exam than after! There are multiple resources for help and tutoring. In addition to using my office hours, you may reach out to tutoring sessions provided by Eta Kappa Nu, Electrical and Computer Engineering Honor Society. In addition, you may utilize the resources of Center for Students Success: <http://hawksites.newpaltz.edu/css/about-us/>
- ◆ Please make sure you save your graded homework, test, and report. I may ask for them in case of any grading discrepancy.

Please pay attention to the following requirements regarding your homework assignments:

- Always use standard size (8½ × 11) paper. Do not use papers torn-off from spiral bound notebooks. (maximum penalty 10%)
- Write the course #, homework set #, and your name on top of the first page, as shown below: (maximum penalty 10%)

<u>Course #</u>	<u>Homework set #</u>	<u>Your first name</u> <u>Your last name</u>
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- Write clearly, neatly, and in an orderly fashion. (maximum penalty 10%)
- Draw schematics and circuit diagrams when applicable. (Maximum penalty 20%)
- Show steps involved getting to the final answer, no credit may be given for the work not shown.
- Box-in your final answers. (Maximum penalty 10%)
- Staple all homework pages together before you turn them in. (Maximum penalty 10%)

Campus-wide Policy Statements

a. Academic integrity policy statement. See www.newpaltz.edu/advising/policies_integrity.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.

b. Reasonable accommodation of individuals with disabilities statement.

Any student who will need classroom and/or testing accommodations based on the impact of a disability should contact the Disability Resource Center, Student Union, Room 210, 845-257-3020. The DRC will provide for your instructors an Accommodation Memo verifying the need for accommodations. Students are encouraged to request accommodations as close as possible to the beginning of the semester.

c. 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 www.newpaltz.edu/veterans; call 845-257-3120, -3124 or -3074; email: np-vms@newpaltz.edu; or stop by the Student Union, Room 100 South.

d. 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, available at www.newpaltz.edu/itpolicy/.

e. 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. See www.newpaltz.edu/ugc/policies/policies_onlineverification.html for the complete policy.

Information on electronic SEIs, which students are encouraged to complete --
I value your feedback and use it to improve my teaching and planning. Please complete the form during the open period on-line

Black Solidarity Day – observed on the first Monday of November, the day before Election Day. Students who choose to participate in Black Solidarity Day should notify me beforehand and will not be held accountable for absence on that day.

Religious Observations -- Students who will be taking time to observe these holidays should communicate with me as soon as possible regarding absences for religious observations and be prepared to discuss plans for making up missed work. I will continue to respect the needs of our students and, in compliance with the New York State Education Law (Chapter 161, Section 224-a)2, honor students' requests for such rescheduling and collaborate with them to determine a path to make up missed work.

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	Last day of classes for Spring 2020
May 7	Study Day
May 8	Common Exam Day
May 11	Final Exam 10:15 AM – 12:15 PM