UNIVERSITY AT ALBANY
State University of New York

Office of the Senior Vice President for Academic Affairs &
Provost

May 11, 2018

Dr. Jinliu (Grace) Wang
Interim Provost and Vice Chancellor for Academic Affairs
State University of New York
State University Plaza
Albany, NY 12246

Dear Dr. Wang,

On behalf of the faculty at the University at Albany, I am pleased to transmit the attached proposal of revision to our existing B.S. in Computer Engineering. The revised program provides a foundation in both electrical and computer engineering and the flexibility for students to emphasize either discipline. To accurately reflect the revised content we are also proposing to change the name of the program to Electrical and Computer Engineering.

These changes have been fully considered and approved through our campus governance system. Should there be a need for additional information or clarification to facilitate processing, please contact Celine LaValley at clavalley@albany.edu.

Thank you for your consideration and assistance.

Sincerely,

James R. Stellar
Provost and Senior Vice President for Academic Affairs

Attachment

c. Vice Provost Jeanette Altarriba, Undergraduate Education
Dean Kim Boyer, College of Engineering and Applied Sciences
Chair Gary Saulnier, Department of Electrical and Computer Engineering

University Hall, 308
1400 Washington Avenue, Albany, New York 12222
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Program Revision Proposal: Changes to an Existing Program

Form 3A

Version 2016-10-13

SUNY approval and SED registration are required for many changes to registered programs. To request a change to a registered program leading to an undergraduate degree, a graduate degree, or a certificate that does not involve the creation of a new program,[1] a Chief Executive or Chief Academic Officer must submit **a signed cover letter and this completed form** to the SUNY Provost at *program.review@suny.edu*.

Section 1. General Information		
a) Institutional Information	Institution's 6-digit SED Code:	210500
	Institution's Name:	University at Albany
	Address:	1400 Washington Avenue, Albany, NY 12222
b) Program Locations	List each campus where the entire program will be offered (with each institutional or branch campus 6-digit SED Code): 210500	
	List the name and address of off-campus locations (i.e., extension sites or extension centers) where courses will offered, **or check here [X] if not applicable**:	
c) Registered Program to be Changed	Program Title:	Computer Engineering
	SED Program Code	38191
	Award(s) (e.g., A.A., B.S.):	B.S.
	Number of Required Credits:	Minimum [124] If tracks or options, largest minimum [ ]
	HEGIS Code:	0999
	CIP 2010 Code:	14.0901
	Effective Date of Change:	Fall 2018
	Effective Date of Completion[2]	Spring 2021
d) Campus Contact	Name and title: Celine LaValley, Assistant to the Dean for Undergraduate Education Telephone and email: 518-442-3950	
e) Chief Executive or Chief Academic Officer Approval	**Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the proposed program.** ***E-signatures are acceptable.*** Name and title: James R. Stellar, Ph.D. Provost and Senior Vice President for Academic Affairs Signature and date: 5/11/18	
	If the program will be registered jointly[3] with one or more other institutions, provide the following information for each institution:	
	Partner institution's name and 6-digit SED Code: Name, title, and signature of partner institution's CEO (or **append** a signed letter indicating approval of this proposal):	

[1] To propose changes that would create a new program, Form 3B, Creating a New Program from Existing Program(s), is required.

[2] If the current program(s) must remain registered until enrolled students have graduated, the anticipated effective date by which continuing students will have completed the current version of the program(s).

[3] If the partner institution is non-degree-granting, see SED's CEO Memo 94-04.

- Renumber some existing courses to place them at the correct level – 1xx for first-year courses, 2xx for second-year courses, 3xx for third-year courses, and 4xx for fourth-year courses – and organize them according to topic in the Bulletin (Catalog).

b) Provide a side-by-side comparison of all the courses in the existing and proposed revised program that clearly indicates all new or significantly revised courses, and other changes.

REGISTERED PROGRAM (UPDATED October 2017)	PROPOSED REVISION
Computer Engineering Core (37 credits):	**Electrical and Computer Engineering Core** (38 credits):
I CEN 140 Introduction to Engineering Design (3)	Course content revised, title and number changed to I CEN 110 Introduction to Engineering (2)
I CEN 150 Introduction to Engineering Analysis (3)	Course content revised, title and number changed to I CEN 111 Introduction to Electrical and Computer Engineering (4)
I CEN 200 Programming for Engineers (4)	Course number changed to I CEN 141
I CEN 280 Introduction to Circuits (3)	Course content revised and number changed to I CEN 202 (4)
I CEN 340 Digital Logic Design (3)	Course content revised, title and number changed to I CEN 231 Digital Systems (4)
I CEN 350 Signals and Systems (3)	Course number changed to I CEN 371
I CEN 370 Digital Signal Processing (3)	Course removed – now an elective
I CEN 380 Introduction to Digital Circuits (3)	Course content revised, title and number changed to I CEN 300 Introduction to Electronics (4)
I CEN 430 Systems Analysis and Design (3)	Course number changed to I CEN 442
I CEN 440 Design Lab I (3)	Course description revised, number and title changed to I CEN 490 ECE Design Lab I (3)
I CEN 450 Design Lab II (6)	Course content revised, title and number changed to I CEN 491 ECE Design Lab II (3). Credits reduced from 6 to 3.
	New Course: I CEN 310 Engineering Electromagnetics (4)
Computer Science (20 credits):	**Computer Science** (11 credits):
I CEN/I CSI 210 Discrete Structures (4)	No change
I CEN/I CSI 213 Data Structures (3)	No change
I CEN/I CSI 333 Programming at the Hardware Software Interface (4)	No change
I CEN/I CSI 400 Operating Systems (3)	Course removed – now an elective
I CEN/I CSI 404 Computer Organization (3)	Course removed – now an elective
I CEN/I CSI 416 Computer Communication Networks (3)	Course removed – now an elective
Math and Science (33 credits):	**Math and Science** (33 credits):
A CHM 120/124 General Chemistry I with lab (4)	No change
A MAT 112 Calculus I (4)	No change
A MAT 113 Calculus II (4)	No change
A MAT 214 Calculus of Several Variables (4)	No change
A MAT 220 Linear Algebra (3)	No change
A MAT 311 Ordinary Differential Equations (3)	No change
A MAT 370 Probability and Statistics for Engineering and the Sciences (3)	No change
A PHY 140 or 142/145 Physics I with lab (4)	No change
A PHY 150 or 152/155 Physics II with lab (4)	No change
Computer Engineering Electives (6 credits) from the following:	Requirement removed
I CEN 360 Emerging Technologies (3)	Course removed
I CEN 410 Internet of Things (IoT) (3)	Course remains an elective
I CEN 417 Optical Communications (3)	Course removed
I CEN 461 GPU Architecture and Programming (3)	Course remains an elective, number changed to 441
I CEN 464 Robotics (3)	Course remains an elective, number changed to 451

REGISTERED PROGRAM (UPDATED October 2017)	PROPOSED REVISION
I CEN 460 Mobile Design Engineering (3)	Course removed
I CEN 470 Human Computer Interaction (3)	Course removed
I CEN 480 VLSI Design and Fabrication	Course remains an elective, number and title changed to ICEN 420 Introduction to VLSI
	New Requirement: **ECE Electives** (6 courses/18 credits): a) 1 (core) course from <u>each</u> of 3 the areas (breadth) b) 2 additional courses from <u>one</u> area, at least 1 of which is a (core) course (depth), c) 1 additional course from <u>any</u> of the 3 areas.
	Area 1: Computers
	I CEN 400 Operating Systems (core) (3)
	I CEN 404 Computer Organization (core) (3)
	New Course: I CEN 453 Cyber-Physical Systems (core) (3)
	Existing Course added to curriculum: I CSI 402 Systems Programming (core) (3)
	Existing Course added to curriculum: I CSI 403 Alg. & Data Structures (core) (3)
	I CEN 416 Computer Comm. Nets (3)
	New Course: I CEN 431 Reconfigurable Computing (3)
	I CEN 441 GPU Architecture & Programming (3) – renumbered from I CEN 461
	I CEN 451 Robotics (3) – renumbered from I CEN 464
	Existing Course added to curriculum: I CSI 435 Introduction to AI (3)
	Existing Course added to curriculum: I CSI 436 Machine Learning (3)
	Area 2: Electronics
	New course: I CEN 401 Advanced Electronics (core) (3)
	New course: I CEN 411 Microwave Engineering (core) (3)
	New course: I CEN 413 Electrical Energy Sys. (core) (3)
	I CEN 420 Introduction to VLSI (core) (3) – renumbered and retitled from I CEN 480 VLSI Design and Fabrication
	New course: I CEN 422 Integrated Circuit Dev. (core) (3)
	New course: I CEN 412 Antenna Engineering (3)
	New course: I CEN 421 Digital ASIC Design (3)
	New course: I CEN 431 Reconfigurable Computing (3)
	New course: I CEN 453 Cyber-Physical Systems (3)
	I CEN 441 GPU Architecture & Programming (3) – renumbered from I CEN 461
	Area 3: Signal Processing, Communications, and Control
	I CEN 416 Computer Comm. Nets. (core) (3)
	I CEN 462 Digital Signal Processing (core) (3) – renumbered from I CEN 370
	New course: I CEN 463 Digital Image Processing (core) (3)
	New course: I CEN 471 Communication Systems (core) (3)
	New course: I CEN 481 Linear Control Theory (core) (3)
	I CEN 451 Robotics (3) – renumbered from I CEN 464
	I CEN 452 Internet of Things (3) – renumbered from ICEN 410
	New course: I CEN 472 Advanced Digital Comm. (3)
	New course: I CEN 473 Radiowave Prop. & Remote Sensing (3)
	Existing Course added to curriculum: I CSI 426 Cryptography (3)

c) For each new or significantly revised course, **provide** a syllabus at the end of this form, and, on the ***SUNY Faculty Table*** provide the name, qualifications, and relevant experience of the faculty teaching each new or significantly revised course. NOTE: *Syllabi for all courses should be available upon request. Each syllabus should show that all work for credit is college level and of the appropriate rigor. Syllabi generally include a course description, prerequisites and corequisites, the number of lecture and/or other contact hours per week, credits allocated (consistent with SUNY policy on credit/contact hours), general course requirements, and expected student learning outcomes.*

Syllabi for new and revised courses are provided in Appendix 1.

d) What are the additional costs of the change, if any? If there are no anticipated costs, explain why.

Adding laboratories to three courses – Digital Systems, Introduction to Circuits, and Introduction to Electronics – will incur some additional costs. These costs will be kept small by using inexpensive modules such as the ADALM2000 Advanced Active Learning Module from Analog Devices ($99) that effectively give students an oscilloscope, power supply, logic analyzer, function generator, and spectrum analyzer. We will also purchase a small number of conventional laboratory instrument sets to provide students with experience using "real" equipment. In a lab section of a course, some students will use the conventional instruments while the remainder use the modules with their laptops. The College of Engineering and Applied Sciences has committed $100,000 over the next 2 years for the purchase of laboratory equipment for this purpose. Faculty are already in place to teach the new courses being added through the revision, so they do not incur additional cost.

Section 2.2. Other Changes

Check all that apply. Describe each proposed change and why it is proposed.

[X] Program title
The revised program will provide a foundation in both computer engineering and electrical engineering and the ability to emphasize either sub-discipline through upper-division electives. The title is being changed to "Electrical and Computer Engineering" to represent the addition of the electrical engineering content.

[ ] Program award

[ ] Mode of delivery
NOTES: *(1) If the change in delivery enables students to complete 50% of more of the program via distance education, submit a Distance Education Format Proposal* as part of this proposal. *(2) If the change involves adding an accelerated version of the program that impacts financial aid eligibility or licensure qualification, SED may register the version as a separate program.*

[ ] Format change(s) (e.g., from full-time to part-time), based on SED definitions, for the **entire** program
1) State proposed format(s) and consider the consequences for financial aid
2) Describe availability of courses and any change in faculty, resources, or support services.

[ ] A change in the total number of credits in a certificate or advanced certificate program

[X] Any change to a registered licensure-qualifying program, or the addition of licensure qualification to an existing program. **Exception:** Small changes in the required number of credits in a licensure-qualifying program that do not involve a course or courses that satisfy one of the required content areas in the profession.

[X] HEGIS and CIP codes: Change HEGIS code to 0909: Electrical, Electronics & Communications Engineering and CIP to 14.10: Electrical, Electronics and Communications Engineering.

Section 3. Program Schedule and Curriculum

a) For **undergraduate programs**, complete the ***SUNY Undergraduate Program Schedule*** to show the sequencing and scheduling of courses in the program. If the program has separate tracks or concentrations, complete a ***Program Schedule*** for each one.

NOTES: *The* ***Undergraduate Schedule*** *must show* ***all curricular requirements*** *and demonstrate that the program conforms to SUNY's and SED's policies.*

- *It must show how a student can complete all program requirements within SUNY credit limits, unless a longer period is selected as a format in Item 2.1(c): two years of full-time study (or the equivalent) and 64 credits for an associate degree, or four years of full-time study (or the equivalent) and 126 credits for a bachelor's degree. Bachelor's degree programs should have at least 45 credits of upper division study, with 24 in the major.*
- *It must show how students in A.A., A.S. and bachelor's programs can complete, within the first two years of full-time study (or 60 credits), no fewer than 30 credits in approved SUNY GER courses in the categories of Basic Communication and Mathematics, and in at least 5 of the following 8 categories: Natural Science, Social Science, American History, Western Civilization, Other World Civilizations, Humanities, the Arts and Foreign Languages*
- *It must show how students can complete Liberal Arts and Sciences (LAS) credits appropriate for the degree.*
- *When a SUNY Transfer Path applies to the program, it must show how students can complete the number of SUNY Transfer Path courses shown in the Transfer Path Requirement Summary within the first two years of full-time study (or 60 credits), consistent with SUNY's Student Seamless Transfer policy and MTP 2013-03.*
- *Requests for a program-level waiver of SUNY credit limits, SUNY GER and/or a SUNY Transfer Path require the campus to submit a Waiver Request –with compelling justification(s).*

EXAMPLE FOR ONE TERM: Undergraduate Program Schedule

Term 2: Fall 20xx	Credits per classification						
Course Number & Title	**Cr**	**GER**	**LAS**	**Maj**	**TPath**	**New**	**Prerequisite(s)**
ACC 101 Principles of Accounting	4			4	4		
MAT 111 College Mathematics	3	M	3	3			MAT 110
CMP 101 Introduction to Computers	3						
HUM 110 Speech	3	BC	3			X	
ENG 113 English 102	3	BC	3				
Term credit total:	16	6	9	7	4		

SUNY Undergraduate Sample Program Schedule

Campus Name	**University at Albany**
Program/Track Title and Award	**Electrical and Computer Engineering/Bachelor of Science**

	Semester	Quarter	Trimester	Other
Calendar Type	x			

SUNY Transfer Path Name (if one exists): **Engineering: Electrical** **<----- Use Dropdown Arrow.**

Use the table to show **how a typical student may progress through the program. Check all columns that apply to a course or enter credits where applicable.**

KEY Course Type: Required (R), Restricted Elective (RE), Free Elective (FE). Course Credits: Number of Credits for individual course (Enter number.) GER Area: SUNY General Education Requirement Area (Enter Area Abbreviation from the drop-down menu.) GER Credits: (Enter number of course credits.) LAS: Liberal Arts & Sciences Credits (Enter X if course is an LAS course.) Major: Major requirement (Enter X.) TPath: SUNY Transfer Path Major & Cognate Courses (Enter X.) Elective/Other: Electives or courses other than specified categories (Enter X.) Upper Div: Courses intended primarily for juniors and seniors outside of the major (Enter X.) Upper Div Major: Courses intended primarily for juniors and seniors within the major (Enter X.) New: new course (Enter X.) Co/Prerequisite(s): List co/prerequisite(s) for the noted courses. SUNY GER Area Abbreviations (the first five listed in order of their frequency of being required by SUNY campuses): Basic Communication (BC), Math (M), Natural Sciences (NS), Social Science (SS), Humanities (H), American History (AH), The Arts (AR), Other World Civilizations (OW), Western Civilization (WC), Foreign Language (FL).

The table will automatically update the number of credits, courses and categories in the program totals table at the bottom of the chart.

Label each term in sequence, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2.

Fall 1

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 110 Intro. to Engineering (REQ)	2			2	2				X	X	Co/P:AMAT 112 or 118
ICEN 111 Introduction to ECE (REQ)	4				4					X	Co/P:AMAT 112 or 118
AMAT 112 or 118 Calculus I (REQ)	4	M	4	4	4				X		
APHY 140 or 142 Physics 1: Mechanics (REQ)	3	NS	3	3	3				X		Co/P:AMAT 112 or 118
APHY 145 Physics Lab I (REQ)	1			1	1				X		Co/P:APHY 140 or 142
Basic Communication Gen Ed (RE)	3	BC	3	3							
Term Totals	**17**	**3**	**10**	**13**	**14**				**4**	**2**	**(X)**

Spring 1

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 141 Programming for Engineers (REQ)	4				4				X		P:ICEN 111, AMAT 112 or 118
AMAT 113 or 119 Calculus II (REQ)	4	M	4	4	4				X		P:AMAT 112 or 118
APHY 150 or 152 Physics 2: Electromagnetism (REQ)	3	NS	3	3	3				X		P:APHY 140 or 142
APHY 155 Physics Lab II (REQ)	1			1	1				X		Co/P:APHY 150 or 152
ICSI 210 Discrete Structures (REQ)	4			4	4						P:AMAT 112 or 118
Term Totals	**16**	**2**	**7**	**12**	**16**				**4**		**(X)**

Fall 2

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
AMAT 214 or 218 Calc of Several Variables (REQ)	4			4	4				X		P:AMAT 113 or 119
ICEN 231 Digital Systems (REQ)	4				4				X		P: ICSI 210, ICEN 141, and ICEN 111
ICSI 213 Data Structures (REQ)	3			3	3				X		P:ICEN 141
ACHEM 120 General Chemistry I (REQ)	3	NS	3	3	3				X		
ACHEM 124 General Chemistry Lab I (REQ)	1			1	1				X		Co/P:ACHEM 120
US History Gen Ed (RE)	3	AH	3	3							
Term Totals	**18**	**2**	**6**	**14**	**15**				**5**		**(X)**

Spring 2

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
AMAT 311 Ordinary Differential Equations (REQ)	3			3	3		3	3	X		P:AMAT 214 or 218
ICEN 202 Introduction to Circuits (REQ)	4				4				X		Co/P:AMAT 311, AMAT 220 or 222 P: APHY 150 or 152
AMAT 220 or 222 Linear Algebra (REQ)	3			3	3						P:AMAT 113 or 119
Arts/International Perspectives Gen Ed (RE)	3	AR/OW	3	3							
Foreign Language Gen Ed (RE)	4	FL	4	4							
Term Totals	**17**	**3**	**7**	**13**	**10**		**3**	**3**	**2**		**(X)**

Fall 3

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 300 Intro. to Electronics (REQ)	4				4		4	4			P:ICEN 202
ICEN 371 Signals & Systems (REQ)	3				3		3	3			P:ICEN 202
ICEN 333 Prog at the Hardware/Software Interface (REQ)	4				4		4	4			P:ICSI 213
AMAT 370 Probability & Stat for Eng. & Sci. (REQ)	3			3	3		3	3			P:ICSI 210
Term Totals	**14**			**3**	**14**		**14**	**14**			**(X)**

Spring 3

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 310 Engineering Electromagnetics (REQ)	4				4		4	4		X	P:ICEN 202
ECE U/L Elective (RE)	3				3		3	3			
Humanities Gen Ed (RE)	3	H	3	3						X	
CEN 442 Systems Analysis and Design (REQ)	3				3		3	3			P: ICEN 300
Term Totals	**13**	**1**	**3**	**3**	**10**		**10**	**10**		**2**	**(X)**

Fall 4

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 490 ECE Design Lab I (REQ)	3				3		3	3			P:ICEN 371, ICEN 300, and ICEN 333
ECE U/L Elective (RE)	3				3		3	3		X	
ECE U/L Elective (RE)	3				3		3	3		X	
ECE U/L Elective (RE)	3				3		3	3		X	
Challenges 21st Century Gen Ed (RE)	3	local	3	3							
Term Totals	**15**	**1**	**3**	**3**	**12**		**12**	**12**		**3**	**(X)**

Spring 4

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
ICEN 491 ECE Design Lab II (REQ)	3				3		3	3			P:ICEN 490
ECE U/L Elective (RE)	3				3		3	3		X	
ECE U/L Elective (RE)	3				3		3	3		X	
Elective (FE)	2					2					
Social Sciences Gen Ed (RE)	3	SS	3	3							
Term Totals	**14**	**1**	**3**	**3**	**9**	**2**	**9**	**9**		**2**	**(X)**

Program Total Summary

Total Credits	SUNY GER Areas	SUNY GER Credits	Liberal Arts & Sciences Credits	Major Credits	Elective and Other Credits	Upper Division Credits	Upper Division Major Credits	Total TPath Courses	New Courses
124	**9**	**36**	**64**	**100**	**2**	**48**	**48**	**15**	**9**

GER Area Summary

Basic Communication (BC)	**1**	**The Arts (AR)**	**1**
Mathematics (M)	**2**	**American History (AH)**	**1**
Natural Sciences (NS)	**3**	**Western Civilization (WC)**	
Social Sciences (SS)	**1**	**Other World Civilizations (OW)**	**1**
Humanities (H)	**1**	**Foreign Language (FL)**	**1**

b) *For **graduate programs**, complete the **SUNY Graduate Program Schedule**. If the program has separate tracks or concentrations, complete a **Program Schedule** for each one.*

***NOTE:** The **Graduate Schedule** must include all curriculum requirements and demonstrate that expectations from Part 52.2(c)(8) through (10) of the Regulations of the Commissioner of Education are met*

Section 4. SUNY Faculty Table

a) If applicable, provide information on faculty members who will be teaching new or significantly revised courses in the program. Expand the table as needed.

b) Append at the end of this document position descriptions or announcements for each to-be-hired faculty member

Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk)	% of Time Dedicated to This Program	Program Courses Which May Be Taught (Number and Title)	Highest and Other Applicable Earned Degrees (include College or University)	Discipline(s) of Highest and Other Applicable Earned Degrees	Additional Qualifications: List related certifications, licenses and professional experience in field
PART 1. Full-Time Faculty					
Kim L. Boyer Professor and Dean	5%	CEN 110 *(Introduction to Engineering)* CEN 202 *(Introduction to Circuits)* CEN 463 *(Digital Image Processing)*	PhD, Purdue	Electrical Engineering	Fellow IEEE, Fellow IAPR, Jefferson Science Fellow
			MSEE, Purdue	Electrical Engineering	~ 40 years' experience, Officer IEEE, President IAPR, >100 publications, 7 books
			BSEE, Purdue	Electrical Engineering	Ohio State, RPI, Bell Labs
Gary Saulnier Professor and Chair*	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 310 *(Engineering Electromagnetics)*	PhD, Rensselaer Polytechnic Institute	Electrical Engineering	Professor of the Electrical, Computer, and Systems Engineering department at Rensselaer Polytechnic Institute

		CEN 401 (*Advanced Electronic Circuits*) CEN 413 *(Electrical Energy Systems)* CEN 471 *(Communication Systems)* CEN 472 (*Advanced Digital Communications)* CEN 490 (*ECE Design Lab 1)* CEN 491 (*ECE Design Lab 2)*	ME, Rensselaer Polytechnic Institute	Electrical Engineering	Associate Head for Undergraduate Studies at Rensselaer Polytechnic Institute
			BS, Rensselaer Polytechnic Institute	Electrical Engineering	Electrical Engineer at General Electric Corporate Research and Development Center, Schenectady, NY
Hany Elgala Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 231 *(Digital Systems)* CEN 431 *(Reconfigurable Computing)* CEN 453 *(Cyber-Physical Systems)* CEN 471 *(Communication Systems)* CEN 472 (*Advanced Digital Communications)*	PhD, Jacobs University (Germany)	Electrical Engineering	3 years' postdoc, Boston U, 1 year Research Prof., BU
			BSc, Ain-Shams University (Egypt)	Electrical Engineering	
Yelin Kim Assistant Professor	100%	CEN 463 *(Digital Image Processing)*	PhD, University of Michigan	Electrical Engineering	GE Global Research
			MS, University of Michigan	Electrical Engineering	Infosys Technologies
			BS, Seoul National University (Korea)	Electrical Engineering	
Tolga Soyata Associate Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 231 *(Digital Systems)* CEN 421 *(Digital ASIC Design)*	PhD, University of Rochester	Electrical and Computer Engineering	Research Assistant Professor, U of Rochester
			MS, Johns Hopkins University	Electrical and Computer Engineering	Soyata Computers, successful startup - sold to Just Solutions

		CEN 422 *(Integrated Circuit Devices)* CEN 431 *(Reconfigurable Computing)* CEN 481 *(Linear Control Theory)* CEN 490 (*ECE Design Lab 1)* CEN 491 (*ECE Design Lab 2)*	BS, Istanbul Technical University (Turkey)	Electrical and Computer Engineering	
Daphney Zois Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 481 *(Linear Control Theory)*	PhD, University of Southern California	Electrical Engineering	Postdoctoral researcher, University of Illinois
			MS, University of Southern California	Electrical Engineering	Systems Administrator, U of Patras
			B Eng, University of Patras (Greece)	Computer Engineering and Computer Science	
James Moulic Professor and Associate Dean for Applied Learning and Cooperative Education	80%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 231 *(Digital Systems)* CEN 310 *(Engineering Electromagnetics)* CEN 421 *(Digital ASIC Design)* CEN 422 *(Integrated Circuit Devices)* CEN 431 *(Reconfigurable Computing)*	PhD, NYU Poly	Electrical Engineering	IEEE Fellow, Professor of Electrical and Computer Engineering, University of Alaska - Anchorage
			MS, University of Illinois	Electrical Engineering	Senior Manager, IBM TJ Watson Research Center, Yorktown Heights
			BS, University of Illinois	Electrical Engineering	IBM liaison to RPI's capstone design program
					ABET Program Evaluator
Weifu Wang Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 463 *(Digital Image Processing)*	PhD, Dartmouth College	Computer Science	
			BS, Nanjing University	Software Engineering	Minor, Business Administration and Management

Dola Saha Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 453 *(Cyber-Physical Systems)* CEN 471 *(Communication Systems)* CEN 472 (*Advanced Digital Communications)*	PhD, University of Colorado	Computer Science	Research Assistant Professor, Rutgers University WINLAB, Dept. of Electrical and Computer Engineering
			MS, University of Colorado	Computer Science	Researcher, NEC Laboratories
			BTech, Kalyani University (India)	Information Technology	
Aveek Dutta Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 431 *(Reconfigurable Computing)* CEN 453 *(Cyber-Physical Systems)* CEN 471 *(Communication Systems)* CEN 472 *(Advanced Digital Communications)* CEN 481 *(Linear Control Theory)*	PhD, University of Colorado	Electrical Engineering	Assistant Professor of Electrical Engineering and Computer Science, University of Kansas
			MS, University of Colorado	Electrical Engineering	Postdoctoral researcher, Princeton University
			BTech, Kalyani University (India)	Electronics & Telecommunications	
Mustafa Aksoy Assistant Professor	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 310 *(Engineering Electromagnetics)* CEN 412 *(Antenna Engineering)* CEN 411 *(Microwave Engineering)* CEN 473 *(Radiowave Propagation and Remote Sensing)*	PhD, Ohio State University	Electrical and Computer Engineering	Post-Doctoral Research Associate, NASA Goddard Space Flight Center
			MS, Ohio State University	Electrical and Computer Engineering	
			BS, Bilkent University	Electrical and Electronics Engineering	
Guy Cortesi Professor of Practice	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 231 *(Digital Systems)* CEN 422 *(Integrated Circuit Devices)* CEN 431 *(Reconfigurable Computing)* CEN 490 (*ECE Design Lab 1)* CEN 491 (*ECE Design Lab 2)*	PhD, University at Albany	Information Science	Extensive industrial R&D experience
			MS, Clarkson	Electrical and Computer Engineering	Successful entrepreneurial activities
			BS, Clarkson	Electrical and Computer Engineering	
Jonathan Muckell Professor of Practice	100%	CEN 110 *(Introduction to Engineering)* CEN 111 *(Introduction to ECE)* CEN 202 *(Introduction to Circuits)* CEN 231 *(Digital Systems)* CEN 490 (*ECE Design Lab 1)*	PhD, University at Albany	Information Science	Experience with NYS
			MS, Rensselaer Polytechnic Institute	Computer and Systems Engineering	Chief Technology Officer

		CEN 491 (*ECE Design Lab 2)*	BS, St. Lawrence	Electrical and Computer Engineering	
Won Namgoong Professor and Associate Dean for Research (new hire, starting Fall 2018)	80%	CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 421 *(Digital ASIC Design)* CEN 422 *(Integrated Circuit Devices)*	PhD, Stanford University	Electrical Engineering	Associate Department Head, UT Dallas
			MS, Stanford University		Senior Scientist, Atheros Communications
			BS, U.C. Berkeley		Co-Founder, WiWiCom
Mohammed Agamy Associate Professor (new hire, starting Fall 2018)	100%	CEN 202 *(Introduction to Circuits)* CEN 300 *(Introduction to Electronics)* CEN 310 *(Engineering Electromagnetics)* CEN 413 *(Electrical Energy Systems)* CEN 481 *(Linear Control Theory)*	PhD, Queen's University, CA	Electrical Engineering	Senior Power Electronics Engineer, General Electric Global Research, Niskayuna, NY
			MS, Alexandria University, Egypt		Adjunct Professor, University of British Columbia, BC, CA
			BS. Alexandria University, Egypt		Postdoctoral Researcher, Queen's University, CA
Amir Masoumzadeh Assistant Professor, Computer Science	0%	CSI 402 *(Systems Programming)*	PhD, University of Pittsburgh	Information Science	
			MS, Sharif University of Technology	Computer Science	
			BS, Ferdowsi University	Engineering	
Pradeep K. Atrey Associate Professor, Computer Science	0%	CSI 426 *(Cryptography)*	PhD, National University of Singapore	Computer Science	Director of Computer Science Undergraduate Program
			MS, Birla Institute of Technology and Science	Software Systems	
			BTech, Harcourt Butler Technological Insitute, Kanpur Univerity	Computer Science and Engineering	
Siwei Lyu	0%	CSI 436 *(Machine Learning)*	PhD, Dartmouth College	Computer Science	Post-doctoral Researcher at Howard Hughes Medical

Associate Professor, Computer Science			MS, Beijing University	Computer Science	Institute and the Center for Neural Science of New York University
			BS, Beijing University	Information Science	
Ming-Ching Chang Assistant Professor, Computer Science	0%	CSI 435 *(Introduction to Artificial Intelligence)*	PhD, Brown University	Engineering	Lead Computer Scientist, Computer Vision Lab, GE Global Research, Niskayuna
			MS, National Taiwan University (Taiwan)	Computer Science and Information Engineering	Adjunct Professor, Computer Science, UAlbany
			BS, National Taiwan University (Taiwan)	Civil Engineering	
PART 2. Part-Time Faculty					
Andrew Gallo Adjunct Lecturer, Computer Science	0%	CSI 403 *(Algorithms and Data Structures)*	MS, University of Delaware	Computer Science	Sr. Application Architect, GE Global Research, Niskayuna, NY
			BS, State University of New York at Albany		Founder and Chief Engineer, 518 Computing, Albany, NY
					Software Architect, CDG, a Boeing Company
					Director of Engineering, KnowledgeXtensions, Albany, NY

Appendix 1: Syllabi for new courses, significantly revised courses and existing courses added to curriculum

ICEN 110	Introduction to Engineering
ICEN 111	Introduction to ECE
ICEN 202	Introduction to Circuits
ICEN 231	Digital Systems
ICEN 300	Introduction to Electronics
ICEN 310	Engineering Electromagnetics
ICEN 401	Advanced Electronic Circuits
ICEN 411	Microwave Engineering
ICEN 412	Antenna Engineering
ICEN 413	Electrical Energy Systems
ICEN 421	Digital ASIC Design
ICEN 422	Integrated Circuit Devices
ICEN 431	Reconfigurable Computing
ICEN 453	Cyber-Physical Systems
ICEN 463	Digital Image Processing
ICEN 471	Communication Systems
ICEN 472	Advanced Digital Communications
ICEN 473	Radio Wave Propagation and Remote Sensing
ICEN 481	Linear Control Theory
IECE 490	ECE Design Lab I
IECE 491	ECE Design Lab II

Existing Computer Science Courses added as electives

ICSI 402	Systems Programming
ICSI 403	Algorithms and Data Structures
ICSI 426	Cryptography
ICSI 435	Introduction to Artificial Intelligence
ICSI 436	Machine Learning

University at Albany / Electrical and Computer Engineering

Introduction to Engineering

CEN 110 Section xxxx

Credits: 2

Term/Year

Meeting Time: TBD

This course will meet 110 minutes/week

Location: TBD

Instructor	Guy Cortesi
Instructor Title	Professor of Practice, ECE
Office Location	Li80
Office hours	TBD
E-mail Address	gcortesi@albany.edu
TA's / Peer Educators	TBD
Prepared By	Guy Cortesi

Textbooks:

Engineering Fundamentals: An Introduction to Engineering, 5th Edition Saeed Moaveni ISBN-13: 9781305084766 (2016)

COURSE DESCRIPTION / OVERVIEW:

An introduction to engineering, including problem solving and other skill sets essential for engineers. Using a combination of assignments and classroom lectures and presentations, students will learn how to formulate, articulate, and solve engineering problems, and how to present engineering work in written form. Students will learn about the different disciplines within engineering and the multidisciplinary nature of modern engineering. Students will gain a better understanding of how fundamental scientific principles relate to engineering.

PREREQUISITE/COREQUISITE:

AMAT 112 or AMAT 118 Calculus I

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Articulate and understand what an engineer is and what an engineer does. They will also gain an understanding of various engineering disciplines such as electrical, computer, software, mechanical, civil, environmental, etc.
- Explore professional ethic issues
- Understand the design process—the basic methodology of problem solving
- Understand contemporary issues in engineering
- Understand the central topics of the engineering discipline and related interdisciplinary fields.
- Understand the procedures, practices, methodology and fundamental assumptions of the engineering discipline and its related interdisciplinary fields.
- Understand multiple perspectives on the subject matter and field of engineering and its related interdisciplinary fields. Use various analysis tools such as Excel and Matlab to solve engineering problems.
- Use various analysis tools such as Excel and Matlab to solve engineering problems.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the concepts and tools for engineering design in a combination of team and individual assignments/labs/projects, tests, and a final project that includes research and design, a written component, and an oral presentation.

Exams: Two exams will be given.

Assignments: Assignments are to be completed outside of class. They will be graded on a 10-point scale and will be totaled together to account for 40% of the final grade.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Exams (2) 30% (15 points each)
Assignments (6) 60% (10 points each)
Class Participation and Attendance: 10%
Total possible points = 100

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

The instructor may choose to re-curve the distribution, in favor of students.

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Timely Assessment

Patterns of testing, assignments, and examinations vary widely across departments and courses. It is important, however, that students in all courses be provided with assessment of their progress in a timely way. Students will receive some formal assessment of their progress well before the last date to withdraw from a course.

Student Conduct

Student and staff/faculty interactions in the class room and other on-campus environments are expected to be professional and cordial. Disruptive behavior in the class room may be treated by the instructor as a violation of the U Albany Student Code of Conduct, and subject to a formal Student Conduct Referral.

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 2-point deduction from your class participation grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

Students With Disabilities

Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Director of the Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage

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its commitment to that cause, the University has appointed a full time administrator to ensure our realization of this important agenda. Further information can be found at the following U Albany url:

http://www.albany.edu/titleIX/indexmain.php

Academic Honesty and Overall Regulations

Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree. Plagiarism and other acts of academic dishonesty will be punished. Read the Standards of Academic Integrity and policies in the Undergraduate Bulletin

(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific h/w and lab assignments and materials will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class. There will be additional readings related to certain course topics.

Class	Day	Date	Topic	Readings	Notes
			PART 1 – Engineering Intro		
1			Intro to Course Intro to Engineering – what is an engineer? Common Traits of Good Engineers	Chapter 1	
2			Preparing for Engineering Careers, time management, student and professional profiles	Chapter 2	
3			Intro to the Design Process – teaming, project management / scheduling, case studies	Chapter 3	Assignment 1 Due
4			Engineering Communication - written and oral skills, graphical communication, presenting	Chapter 4	
5			Engineering Ethics – engineering creed and codes	Chapter 5	Assignment 2 Due
			PART 2 – Engineering Fundamentals		
6			Dimensions and Units in Engineering – significant digits, unit conversion	Chapter 6	
7			Length Variables in Engineering – Radians, Strain, Area, Volume	Chapter 7	
8			Time Variables in Engineering – Period and Frequency, Angular speed and acceleration, linear	Chapter 8	Assignment 3 Due
			Exam 1		
9			Mass Variables in Engineering – flow rates, momentum, kinetic energy, density, specific volume	Chapter 9	

10			Force Variables in Engineering – force, torque, work, moment, energy, power pressure stress, elasticity, ridigity	Chapter 10	Assignmen t 4 Due
11			Temperature Variables in Engineering – temperature difference, heat transfer, thermal expansion, specific heat	Chapter 11	
12			Intro to Electric Circuits – charge and current density, voltage, current, resistance,impedance	Chapter 12	Assignment 5 Due
13			Energy and Power - Work, Mechanical Energy, and Thermal Energy. Conservation of Energy. Power. Efficiency. Energy Sources, Generation, and Consumption	Chapter 13	
			PART 3 – Resources for Engineering Design		
14			Intro to Using Excel for Engineering Analysis	Chapter 14	Assignment 6 Due
15			Exam 2		

University at Albany / Electrical and Computer Engineering

Introduction to Electrical and Computer Engineering

CEN 111 Section xxxx

Credits: 4

Term/Year

Meeting Time: TBD

This course will meet 220 minutes/week

Location: TBD

Instructor	Guy Cortesi
Instructor Title	Professor of Practice, ECE
Office Location	Li80
Office hours	TBD
E-mail Address	gcortesi@albany.edu
TA's / Peer Educators	TBD
Prepared By	Guy Cortesi

Textbook and Equipment (Required):

Introduction to Engineering Analysis, Kirk D. Hagen (Author), ISBN-13: 978-0133485080 ISBN-10: 0133485080 4th Edition (2013)

Arduino Uno Kit - https://www.sparkfun.com/products/13930 (**available from bookstore**) **OR** https://www.amazon.com/Elegoo-Project-Starter-Tutorial-Arduino/dp/B01DGD2GAO/ref=sr_1_2_sspa?ie=UTF8&qid=1508277643&sr=8-2-spons&keywords=Arduino+basic&psc=1 (**available from Amazon**)

COURSE DESCRIPTION / OVERVIEW

An introduction to fundamental concepts, skills, and technologies in Electrical and Computer Engineering. Students are introduced to modern engineering tools and logical and systematic ways to analyze and solve problems in electrical and computer engineering.

PREREQUISITES

None

COREQUISITES

AMAT 112 or AMAT 118 Calculus I

LEARNING OBJECTIVES / OUTCOMES:

After completing the course, students will be able to:

- Work with binary numbers, matrices, and complex numbers
- Work with basic electronic circuits
- Use basic electrical and computer engineering tools, specifically MATLAB, SPICE, Overleaf (using the LaTeX language), Excel, and Python.
- Acquire, analyze, plot and interpret data
- Understand the basics of simulation, modeling, and reporting the results
- Model engineering problems using computer software
- Understand the central topics of Electrical and Computer Engineering design and related interdisciplinary areas
- Appreciate the procedures, practices, methodology and fundamental assumptions of Electrical and Computer Engineering design and related interdisciplinary areas.
- Understand multiple perspectives on the subject matter and field of Electrical and Computer Engineering design and related interdisciplinary areas
- Work in an active learning environment via labs and group and individual activities that enables them to be producers as well as consumers of knowledge
- Perform critical inquiry into the assumptions, goals, and methods of various related fields of academic study; with an aim to develop the interpretive, analytic, and evaluative competencies characteristic of critical thinking

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the circuit concepts in a combination of quizzes, lab projects, and exams.

Exams: Two exams will be given.

Quizzes: ~10 (the number may change) pop quizzes will be given during the lectures and labs.

Lab Projects: ~10 (the number may change) lab projects will be completed instructions.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Exams (2): 40% (20 points each)
Lab Projects (~10): 20% (total)
Quizzes (~10): 40% (total)

Total possible points = 100

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 86-84 points B-: 83-80 points
C+: 79-77 points C: 76-74 points C-: 73-70 points
D+: 69-67 points D: 66-64 points D-: 63-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course.

Incomplete (I): A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Fail with no attendance (Z): Students are expected to attend every class and to arrive on time. A grade of "Z" will be given to students who fail to attend a substantial portion of the lectures, exams, and/or labs and/or fail to submit homework continuously.

Timely Assessment

Patterns of testing, assignments, and examinations vary widely across departments and courses. It is important, however, that students in all courses be provided with assessment of their progress in a timely way. Students will receive some formal assessment of their progress well before the last date to withdraw from a course.

Student Conduct

Student and staff/faculty interactions in the class room and other on-campus environments are expected to be professional and cordial. Disruptive behavior in the class room may be treated by the instructor as a violation of the U Albany Student Code of Conduct, and subject to a formal Student Conduct Referral.

Attendance/Lateness/Use of Computers in class

Students are expected to attend every class and to arrive on time. Although attendance won't be taken during lectures and labs, MISSING POP QUIZZES and LAB PROJECTS may lower your grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see

http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

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(http://www.albany.edu/undergraduate_bulletin/regulations.html). The standards described in this document will be applied in this course relating to academic honesty and overall regulations.

Plagiarism and other acts of academic dishonesty will be punished. Students are expected to submit original work. While you may discuss a problem with another student, the work you submit must be your own. Any student who submits copied work or any student that provides work for copying will earn a zero grade for that assignment. If there is more than one copying incident, the student will be graded an F for the class. As per college policy, cheating activity will be reported to the college administration.

COURSE OUTLINE AND READINGS:

The following schedule of lecture/lab topics is preliminary and may be changed as the semester progresses. The final schedule will be provided on Blackboard. Students are expected to have read the listed material before it is covered in class.

Week	Day	Date	Topic	Readings	Notes
			Introduction to Engineering Problems & Tools: MATLAB, OVERLEAF / LaTeX		
1			Intro to Course, Dimensions and Units, Binary numbers, Matrices, and Complex Numbers	Chapter 1, 2	
			Lab 1		
2			Dimensions and Units, Binary numbers, Matrices, and Complex Numbers	Chapter 3	
			Lab 2		
3			Introduction – MATLAB, MATLAB Programming		
			Lab 3		
4			MATLAB Plotting – Simple Engineering Problems		
			Lab 4		
5			Introduction to Overleaf and LaTeX, Overleaf, MATLAB and Excel: Measuring, Reporting, and Presenting		
			Lab 5		
			Test 1		
			Circuit Analysis: SPICE / Arduino / Merging Tools		
6			Basic Electrical Circuits and Systems	Chapter 5	
			Lab 6		
7			Introduction to SPICE for Circuit Simulation		
			Lab 7		
8			SPICE – Netlists, Plotting Circuit Simulations	Chapter 9	
			Lab 8		
9			Merging Simulation Results of SPICE, MATLAB; Reporting Circuit Simulation Results Using LaTeX		
			Lab 9		
1			Introduction to the Arduino		
			Lab 10		
1			Programming and Interfacing with the Arduino		
			Lab 11		
			Data Analysis and Reporting: Python / Merging Tools		
12			Introduction to Data Acquisition & Storage, Intro to Python	Chapter 10	
			Lab 12		
13			Programming, Plotting & Crunching in Python		
			Lab 13		

14			Combining MATLAB, Python, Data Reporting using LaTeX (Overleaf)		
			Lab 14		
`			Data Reporting using LaTeX (Overleaf), Final Project Discussions, Test 2 Discussions		
			Test 2		
			Applications: Final Projects		
15			Final Project Demos (Group 1)		Final Projects GitHub Documentati

* Class Schedule may slightly change according to university holidays

University at Albany / Electrical and Computer Engineering

Introduction to Circuits

CEN 202 Section xxxx

Credits: 4

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week for lecture and 3 hours/week for lab

Location: TBD

Instructor	Mustafa Aksoy
Instructor Title	Assistant Professor, ECE
Office Location	LI 091A
Office hours	TBD
E-mail Address	maksoy@albany.edu
TA's / Peer Educators	TBD
Prepared By	Mustafa Aksoy

Textbooks (required):

The Analysis and Design of Linear Circuits, 7th Edition
Roland E. Thomas, Albert J. Rosa, and Gregory J. Toussaint
ISBN: 978-1-118-06558-7

Other textbooks can be used as additional references.

COURSE DESCRIPTION / OVERVIEW:

Review of basic circuits, voltage and current division, and Thevenin and Norton equivalent circuits. Analysis of circuits using the matrix formulation of Kirchhoff's Current and Voltage Laws. Operational Amplifiers. Study of circuits with capacitors and inductors using linear differential equations. Sinusoidal steady state response of basic circuits, phasor circuit analysis, and frequency dependence. Passive filter design and analysis. Laplace Transform and s-domain circuit analysis. This course includes a laboratory.

PREREQUISITES

PHY 150, 151, or 152 Physics 2

COREQUISITES

MAT 311 Ordinary Differential Equations and either MAT 220 or 222 Linear Algebra

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Formulate basic linear circuits; and exploit linearity in them via superposition and Thevenin & Norton equivalent circuits.
- Analyze linear circuits by solving the matrix formulation of Kirchhoff's Current and Voltage Laws.
- Perform time-domain analysis techniques for first and second order circuits by solving linear differential equations; and identify various components of solutions.
- Perform sinusoidal steady state analysis of circuits in frequency domain using phasor transformation.
- Design and analyze passive filters which consist of resistors, capacitors, and inductors.
- Apply Laplace transform to linear circuits, and analyze them in s-domain.
- Gain hands-on circuit experience through the lab sessions, and apply it to solve real engineering problems.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the circuit concepts in a combination of quizzes, lab projects, and exams.

Exams: Two exams will be given – a mid-term and a final exam.
Quizzes: ~10 (the number may change) pop quizzes will be given during the lectures and labs.
Lab Projects: ~10 (the number may change) lab projects will be completed instructions.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Exams (2): 40% (20 points each)
Lab Projects (~10): 20% (total)
Quizzes (~10): 40% (total)

Total possible points = 100

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
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The instructor may choose to re-curve the distribution, in favor of students.

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

The following schedule of lecture/lab topics is preliminary and may be changed as the semester progresses. The final schedule will be provided on Blackboard. Students are expected to have read the listed material before it is covered in class.

Week/Lab	Day	Date	Topic	Readings
Week 1			Course Introduction Voltage, Current, Resistor, Ohm's Law, Kirchhoff's Current and Voltage Laws, Norton and Thevenin Equivalent Circuits	Chapter 1-2
Lab 1			Lab 1 – Introduction to NI VirtualBench and ADALP2000 Kit	
Week 2			Node-Voltage Analysis, Mesh-Current Analysis, Linearity Properties	Chapter 3
Lab 2			Lab 2 – Introduction to LTspice	
Week 3			Node-Voltage Analysis, Mesh-Current Analysis, Linearity Properties	Chapter 3
Lab 3			Lab 3 – Linear Resistive Circuit Analysis	
Week 4			Active Circuits, Operational Amplifiers, OP AMP Circuit Analysis and Design	Chapter 4
Lab 4			Lab 4 – A simple OP AMP Circuit	
Week 5			Signal Waveforms: Step, Exponential, Sinusoidal and Composite Waveforms	Chapter 5

Lab 5			Lab 5 - Complex Numbers Tutorial	
Week 6			Capacitors, Inductors, First Order (RC and RL) Circuits and their time responses	Chapter 6-7
Lab 6			Lab 6 – Time Response Analysis of RL and RC Circuits	
Week 7			First Order (RC and RL) and Second Order (RLC) Circuits and their time responses	Chapter 7
Lab 7			Lab 7 – Time Response Analysis of an RLC Circuit	
Week 8			Midterm Exam, Midterm Exam Solutions	
Lab 8			Lab 8 – Course Review	
Week 9			Sinusoidal Steady-State Response of Circuits: Phasors and Circuit Analysis with Phasors	Chapter 8
Lab 9			Lab 9 – Steady State Analysis of an RLC Circuit	
Week 10			Frequency Response of First and Second Order Circuits, Bode Diagrams	Chapter 12
Lab 10			Lab 10 - Frequency Response Analysis of an RLC Circuit	
Week 11			Passive Filters: Low Pass, High Pass, and Band Pass Filter Design and Analysis	Chapter 12
Lab 11			Lab 11 – Design and Analysis of a Low Pass Filter	
Week 12			Passive Filters: Low Pass, High Pass, and Band Pass Filter Design and Analysis	Chapter 12
Lab 12			Lab 12 – Design and Analysis of a High Pass Filter	
Week 13			Laplace Transforms, Properties and Pairs	Chapter 9
Lab 13			Lab 13 – Design and Analysis of a Band Pass Filter	
Week 14			Circuit Analysis in s-domain	Chapter 10
Lab 14			Lab 14 – Review, Preparation for the Final Exam	
Week 15			Networks and Network Functions	Chapter 11 and

				Chapter 17
			Final – XX.XX am/pm*	

* See Final exam schedule at the university website

* Class Schedule may slightly change according to university holidays

University at Albany / Electrical and Computer Engineering

Digital Systems

CEN 231 Section xxxx

Credits: 4

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week for lecture and 3 hours/week for lab

Location: TBD

Instructor	James Moulic
Instructor Title	Professor, ECE
Office Location	Draper 112
Office hours	TBD
E-mail Address	jmoulic@albany.edu
TA's / Peer Educators	TBD
Prepared By	James Moulic

Textbooks (required):

Digital Fundamentals, 11th Edition
Thomas L. Floyd
Pearson, 2015. ISBN-13: 978-0132737968

COURSE DESCRIPTION / OVERVIEW:

An introduction to digital logic hardware used in modern computing systems. Boolean algebra, number systems, digital arithmetic, basic logic gates, combinational logic circuits, complex logic building blocks, including multiplexers, decoders and flip-flops, registers and memory arrays. Methods and techniques for the analysis, design and synthesis of combinational logic, sequential logic and memory circuits. An introduction to, and "hands-on" experience with, state-of-the-art electronic design automation (EDA) software tools, and hardware description languages (HDL) such as VHDL for practical applications of digital logic designs and implementations using field programmable logic arrays (FPGAs).

PREREQUISITE/COREQUISITE:
CSI/CEN 210 Discrete Structures and C or better in both CEN 111 Introduction to ECE and CEN 141/CEN 200 Programming for Engineers

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Analyze a given combinational or sequential circuit, producing an appropriate truth table or state table and state diagrams.
- Create appropriate state table and state diagrams to satisfy all system specifications.
- Design combinational and sequential circuits to satisfy functional specifications of moderate complexity.
- Use state-of-the art EDA (electronic design automation) computer tools to design, simulate digital logic designs.
- Implement, test, and debug prototype digital systems using standard laboratory equipment, discrete logic chips and integrated logic field-programmable logic array(FPGA) boards
- Predict the timing behavior of combinational and sequential systems.
- Use accepted standards to document sequential logic designs.
- Articulate the benefits and uses of the various design technologies for realizing digital systems.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the concepts and tools for engineering design in a combination of team and individual assignments/labs/projects, tests, and a final project that includes research and design, a written component, and an oral presentation.

Exams: There will be 2 examinations in this course; one midterm and a final. Each is a closed-book exam. You may bring a calculator. No access to any material online, or in an electronic device, is permitted. The final will be comprehensive covering material from the entire course.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Class Participation: 10%
Homework (5 assignments): 25%
Midterm Exam: 25%
Final Exam: 40%
Total possible points = 100

Grading Scale

A: 100-92 points A-: 91-88 points
B+: 87-85 points B: 84-80 points B-: 79-75 points
C+: 74-70 points C: 69-65 points, C-: 64-60 points
D+: 59-56 points D: 56-53 points D-: 52-50
E: 49 points and below

The instructor may choose to re-curve the distribution, in favor of students.

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Timely Assessment

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Student Conduct

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Responsible Computing

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Students With Disabilities

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific h/w and lab assignments and materials will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class. There will be additional readings related to certain course topics.

Week	Lecture	Topic	Readings	HW / Lab
1	1	Introduction & Course Overview	Chapter 1, 2,and 3	
	2	Number Systems, Operations and Codes. Basic Logic Gates		
2	3	Boolean Algebra and Logic Optimization Techniques :	Chapter 4	
	4	Boolean Algebra postulate , theorems and identities		
3	5	Combinatorial Logic Analysis: Karnaugh Maps	Chapter 5	
	6			
4	7	Combinatorial Logic Analysis, Continued	Chapter 5	
	8	**Combinatorial Logic Functions:** **Half adders, full adders, ripple adders, subtractors using twos complement**	Chapter 6	
5	8	Combinatorial Logic Functions, Continued:	Chapter 6	

		comparators, decoders, multiplexors, parity generators		
	9	Synchronous, Sequential Logic Circuits: Clocked logic, storage elements, flip flops, and latches	Chapter 7	
6	10	Synchronous, Sequential Logic Circuits, continued: Sequential logic analysis and synthesis and finite state machines	Chapter 7	
	11			
7	12	Synchronous, Sequential Logic Circuits, continued: Counters: up-down , synchronous counters	Chapter 7, Chapter 9	
	13			
8	14	Review: Midterm Exam		
	15	Midterm Exam		
9	16	Memory and Storage for Digital Computers : Memory hierarchy, registers, cache, main memory, DRAM, mass storage (HDDs, SSDs) Memory addressing, read write controls for memory	Chapter 11	
	17	Split memory addressing for large memory arrays	Chapter 10	
10	18	Programmable Logic Devices: FPGA technology and operation Hardware Description Languages	Chapter 10	
	19	Introduction to the VHDL		
11	20	Programmable Logic Devices, Continued: Boolean expressions in VHDL Combinatorial logic design using VHDL	Chapter 10	
	21			
12	22	Introduction and Use of FPGA design tools: Xilinx Vivado	Chapter 10	
	23			

		Design and implementation of combinatorial logic designs using VDHL and FPGAs		
13	24	Design and implementation of combinatorial logic designs using VDHL and FPGAs, Continued	Chapter 10	
	25			
14	26	Design and implementation of sequential logic designs using VHDL and FPGAs	Chapter 10	
	27			
15	28	Design and implementation of sequential logic designs using VHDL and FPGAs, Continued	Chapter 10	
	29	Final Exam Review		
16		Final Exam:		

University at Albany / Electrical and Computer Engineering

Introduction to Electronics

CEN 300 Section xxxx

Credits: 4

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week for lecture and 3 hours/week for lab

Location: TBD

Instructor	Tolga Soyata
Instructor Title	Associate Professor, ECE
Office Location	RI 396
Office hours	TBD
E-mail Address	tsoyata@albany.edu
TA's / Peer Educators	TBD
Prepared By	Tolga Soyata

Textbooks (required):

Microelectronic Circuits, 7th edition, Adel S. Sedra and Kenneth C. Smith, Oxford University Press, ISBN-13: 978-0199339136, 2014.

COURSE DESCRIPTION / OVERVIEW:

Basic electronic and physical properties of semiconductors materials. Functional characteristics and electronic models of Silicon semiconductor diodes and transistors (field effect transistors and bipolar junction transistors). DC biasing, and static current-voltage (I-V) and transient behavior of transistors, and transistor circuits. Analog circuit applications of transistor such as single stage and multi-stage amplifiers, op-amps. Frequency response and feedback characteristics of transistor circuits. Digital circuit applications of single and multi-stage transistor circuits. Introduction and use of computer aided circuit design and simulation tools and techniques. Hands-on lab experimentation constructing circuits to test and measure functional and performance characteristics.

PREREQUISITES:

CEN 280 Introduction to Circuits or CEN 202 Introduction to Circuits

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Explain the operating principles of diode, bipolar and MOS transistors
- Analyze and design operating point bias circuits for diodes and transistors
- Determine small signal models of bipolar and MOS transistors
- Analyze and design diode and single transistor circuits
- Perform dc & small signal analyses & design of bipolar/CMOS amplifiers
- Analyze and design of multiple transistor circuits, and operational amplifiers
- Use feedback to control the frequency response of a transistor amplifier.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the circuit concepts in a combination of quizzes, lab projects, and exams.

Exams: 3 written exams will test the knowledge of the student through the semester. 2 of them are during the lab time and one (final exam) is at a time assigned by the registrar.

Labs: 5 hands-on laboratory sessions will be assigned and will be conducted in the lab. They will be graded on a 5-point scale and will be totaled together to account for 25% of the final grade. Graded labs are shown as QUIZ below.

Practice Sessions: 5 practice sessions will be conducted in the lab, during the lab time. They are not graded. They serve the purpose of helping students prepare for the graded labs (quizzes). They are shown in the calendar as LAB.

Homework: There will be three individual and one group homework.

Grading
A final grade will be determined as the sum of these scores using the following grades:
Exams (total 3): 39% total (13 points each exam)
Homework (total 4): 36% total (9 points each homework; three individual and one group)
Labs (estimate 5 labs) : 25% (5 points each lab).
Total possible points = 100

Grading Scale

A: 100-95 points A-: 94-90 points

B+: 89-87 points B: 86-84 points B-: 83-80 points
C+: 79-77 points C: 76-74 points C-: 73-70 points
D+: 69-67 points D: 66-64 points D-: 63-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

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Week	Topic	Notes
	Devices and Basic Circuits	
Int, 1	Intro, review of the early material Laplace transform, impedance	
2	Opamp	Chapter 2
3	Diodes: circuit model	Chapter 3
	Zener, Schottky diodes	
4	Diode bridges, rectification, regulation	
5	Bipolar Junction Transistor: circuit model	Chapter 4
6	NMOS, PMOS: circuit model	Chapter 5
	Analog Circuits	
7-8	Differential multi-stage amplifier	Chapter 6
9-10	Frequency response	Chapter 7
11-12	Feedback	Chapter 8
13-14	Output stages and power amplifiers	Chapter 9

University at Albany / Electrical and Computer Engineering

Engineering Electromagnetics

CEN 310 Section xxxx

Credits: 4

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week for lecture and 3 hours/week for lab

Location: TBD

Instructor	Mustafa Aksoy
Instructor Title	Assistant Professor, ECE
Office Location	LI 091A
Office hours	TBD
E-mail Address	maskoy@albany.edu
TA's / Peer Educators	TBD
Prepared By	Mustafa Aksoy

Textbooks (required):

D. K. Cheng, Fundamentals of Engineering Electromagnetics, Addison Wesley, New York, 1993

Other textbooks can be used as additional references.

COURSE DESCRIPTION / OVERVIEW:

Review of Maxwell's equations and time harmonic electric and magnetic fields. Plane waves in lossless and lossy media, group velocity, Poynting vector, and flow of Electromagnetic power. Normal and oblique incidence of plane waves at plane boundaries. Transmission lines, the Smith Chart, and impedance matching. Waveguides. Introduction to antennas and antenna arrays.

PREREQUISITES:

CEN 280 Introduction to Circuits or CEN 202 Introduction to Circuits

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Construct a mathematical model of one-dimensional wave propagation and implement it in both lossless and lossy media.
- Identify electromagnetic boundary conditions; and understand reflection, transmission, and refraction phenomena at the interface between two dissimilar media.
- Formulate and implement wave propagation in transmission lines of different structures (parallel plate, two wire, coaxial etc.), identify the electrical properties of transmission lines, and perform impedance matching on transmission lines.
- Use the Smith Chart to analyze transmission lines
- Formulate and implement wave propagation in waveguides of different structures (rectangular, circular etc.), and identify the electrical properties of waveguides.
- Tell how antennas radiate, define basic antenna parameters (gain, directivity, beamwidth etc.), and compute radiation patterns of simple antennas and antenna arrays.
- Gain hands-on and computational experience to solve electromagnetic problems through the lab sessions, and apply it to solve real engineering challenges.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the circuit concepts in a combination of quizzes, lab projects, and exams.

Exams: Two exams will be given – a mid-term and a final exam.
Quizzes: ~10 (the number may change) pop quizzes will be given during the lectures and labs.
Lab Projects: ~10 (the number may change) lab projects will be completed instructions.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:
Exams (2): 40% (20 points each)
Lab Projects (~10): 20% (total)
Quizzes (~10): 40% (total)

Total possible points = 100

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

The instructor may choose to re-curve the distribution, in favor of students.

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COURSE OUTLINE AND READINGS:

The following schedule of lecture/lab topics is preliminary and may be changed as the semester progresses. The final schedule will be provided on Blackboard. Students are expected to have read the listed material before it is covered in class.

Week/Lab	Day	Date	Topic	Readings
Week 1			Review of Maxwell's Equations and Time Harmonic Electric and Magnetic Fields	Chapter 6
Lab 1			Lab 1 – MATLAB Project: Modeling and Visualization of Time Harmonic Electric and Magnetic Fields	
Week 2			Plane Electromagnetic Waves in Lossless and Lossy Media, Group Velocity, Flow of Electromagnetic Power and the Poynting Vector	Chapter 7
Lab 2			Lab 2 – MATLAB Project: Modeling Plane Waves and Observing the Polarization of Plane Waves	
Week 3			Normal and Oblique Incidence of Plane Waves at Plane Boundaries	Chapter 7
Lab 3			Lab 3 – Real World Application: Study and Simulation of Simple Emission Models in Earth Remote Sensing	
Week 4			Transmission Lines: The Circuit Model and Transmission Line Parameters	Chapter 8
Lab 4			Lab 4 – MATLAB Project: Transmission Line Simulator I	
Week 5			Wave Characteristics of Infinite Transmission Lines	Chapter 8
Lab 5			Lab 5 - MATLAB Project: Transmission Line Simulator II	

Week 6			Wave Characteristics of Finite Transmission Lines	Chapter 8
Lab 6			Lab 6 – MATLAB Project: Transmission Line Simulator III	
Week 7			The Smith Chart and Transmission Line Impedance Matching	Chapter 8
Lab 7			Lab 7 – Demonstration with Real Transmission Lines	
Week 8			Midterm Exam, Midterm Exam Solutions	
Lab 8			Lab 8 – Course Review	
Week 9			General Wave Behaviors along Uniform Guiding Structures: Transverse Electromagnetic, Transverse Electric and Transverse Magnetic Waves	Chapter 9
Lab 9			Lab 9 – MATLAB Project: Waveguide Simulator I	
Week 10			Rectangular Waveguides	Chapter 9
Lab 10			Lab 10 - MATLAB Project: Waveguide Simulator II	
Week 11			Other Waveguide Types	Chapter 9
Lab 11			Lab 11 – Demonstration with Real Waveguides	
Week 12			The Elemental Electric Dipole and Basic Antenna Parameters	Chapter 10
Lab 12			Lab 12 – Demonstration with Real Antennas	
Week 13			Thin Linear Antennas	Chapter 10
Lab 13			Lab 13 – MATLAB Project: Simple Antenna Simulator	
Week 14			Antenna Arrays	Chapter 10
Lab 14			Lab 14 – Review, Preparation for the Final Exam	
			Final – XX.XX am/pm*	

* See Final exam schedule at the university website

* Class Schedule may slightly change according to university holidays

University at Albany / Electrical and Computer Engineering

Advanced Electronic Circuits

CEN 401 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Gary J. Saulnier
Instructor Title	Professor, ECE
Office Location	Li84A
Office hours	TBD
E-mail Address	gsaulnier@albany.edu
TA's / Peer Educators	TBD
Prepared By	Gary J. Saulnier

Textbooks:

Design with Operational Amplifiers and Analog Integrated Circuits, 4th Edition by Sergio Franco

COURSE DESCRIPTION / OVERVIEW:

Linear and non-linear applications of operational amplifiers, with an emphasis on circuit design. Non-ideal operational amplifier behavior, including both static and dynamic characteristics. Amplifier stability and frequency compensation techniques. Operational amplifier based oscillators. Circuit noise.

PREREQUISITES:

CEN 380 Introduction to Digital Circuits or CEN 300 Introduction to Electronics

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- Analyze and design linear op amp circuits

- Determine the error introduced by non-ideal op amp characteristics
- Determine the noise at the output of a circuit containing op amps
- Apply frequency compensation to stabilize op amp circuits
- Analyze and design non-linear op amp circuits

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained.

ASSESSMENT AND POLICIES:

Exams: Three exams will be given.

Projects / Assignments: Weekly homework will be assigned based on the material covered during previous week.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

- Homework - 15% (lowest grade dropped)
- Exams - 75% (25% each)
- Attendance - 10%

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

The instructor may choose to re-curve the distribution, in favor of students.

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 1-point deduction from your class participation grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

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Students With Disabilities

Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please

notify the Director of the Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage

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Academic Honesty and Overall Regulations

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

Classes	Topic	Readings	Notes
1 – 4	Ch 1: Op Amp Fundamentals	Chapter 1	
5 - 7	Ch 2: Circuits with Resistive Feedback	Chapter 2	
8 - 9	Ch 5: Static Op Amp Limitations	Ch 5: 5.1 – 5.4	
10	Exam 1: Ch 1 & Ch 2		
11 - 12	Ch 5: Static Op Amp Limitations (continued)	Ch :, 5.5 – 5.8	
13 - 15	Ch 6: Dynamic Op Amp Limitations	Ch 6: 6.1 – 6.4	
16 - 17	Ch 7: Noise	Ch 7: 7.1 – 7.4	
18 - 19	Ch 8: Stability	Ch 8: 8.1 – 8.2	
20	Exam 2: Ch 5, Ch 6, & Ch 7		
21 - 22	Ch 8: Stability (continued)	Ch 8: 8.4, 8.5	
23 - 25	Ch 9: Nonlinear Circuits	Ch 9: 9.1 -9.4, 9.6, 9.7	
26 - 28	Ch 10: Oscillators		
	Exam 3: Ch 8, Ch 9, & Ch 10		

University at Albany / Electrical and Computer Engineering

Microwave Engineering

CEN 411

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Mustafa Aksoy
Instructor Title	Assistant Professor, ECE
Office Location	Li 91A
Office hours	TBD
E-mail Address	maksoy@albany.edu
TA's / Peer Educators	TBD
Prepared By	Mustafa Aksoy

Textbook (representative):

Microwave Engineering, 4th Edition, David Pozar, Wiley

COURSE DESCRIPTION / OVERVIEW

An introduction to radio frequency and microwave analysis and design. Transmission lines and waveguides, network characterization and analysis, impedance matching and tuning. Passive microwave devices such as power dividers, couplers, resonators, filters, and ferrimagnetic components. An introduction to active devices.

PREREQUISITES

CEN 310 Engineering Electromagnetics and either CEN 380 Introduction to Digital Circuits or CEN 300 Introduction to Electronics

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:
At the completion of the course students will be able to:

- Understand microwave circuit practical design theories for the design and synthesis of passive microwave circuits.
- Use CAD tools to verify the microwave circuits designed, account for real world implementation effects, and optimize the microwave circuits designed.
- Make measurements of microwave circuits using a network analyzer
- Work on a team oriented design project where they design, fabricate, and test a microwave circuit and present their results to the class.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:
The accomplishment of course objectives will be assessed with quizzes, exams and a design project.

Exams: There will a mid-term exam and a final exam.

Quizzes: Five quizzes will be given throughout the semester.

Design Project: Each student will design, fabricate (fabrication will be handled by the department) and test a passive microwave device of their choice and present their efforts to the class.

Grading

A final grade will be determined as a weighted average of the exam and quiz scores using the following weights:

Quizzes: 25% (Five quizzes, each counts 5%)

Mid-term Exam: 25%

Final Exam: 30%

Design Project: 20%

Grading Scale

A: 100-95 points **A-**: 94-90 points
B+: 89-87 points **B**: 86-84 points **B-**: 83-80 points
C+: 79-77 points **C**: 76-73 points **C-**: 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving

their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided on Blackboard. Students are expected to have read the listed material in the textbook before it is covered in class.

Class	Topic	Readings	Notes
	Fundamentals of Electromagnetics		
1-2	Maxwell's Equations and Boundary Conditions		
3	Complex Poynting Vector, Real and Reactive Power, Potentials		

	Transmission Line Theory		
4-5	Lumped-Element Circuit Model for Transmission Lines		
6-8	Field Analysis of Transmission Lines		
9	The Smith Chart		
	Waveguides and Transmission Lines		
10-13	TEM, TE and TM Waves		
14-15	Parallel Plate, Rectangular and Circular Waveguides		
16-17	Coaxial Line, Stripline and Microstrip		
	Microwave Network Analysis		
18	Impedance, Admittance, Scattering and Transmission Matrices		
19	Signal Flow Graphs		
	Impedance Matching and Tuning		
20-21	Matching with Lumped Elements		
22-23	Single-Stub and Double-Stub Tunings and the Quarter Wave Transformer		
	Passive Microwave Circuit Elements		
24	Resonators, Design Project Presentations		
25-26	Power Dividers and Couplers, Design Project Presentations		
27-28	Filters, Design Project Presentations		

University at Albany / Electrical and Computer Engineering

Antenna Engineering

CEN 412

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Mustafa Aksoy
Instructor Title	Assistant Professor, ECE
Office Location	Li 91A
Office hours	TBD
E-mail Address	maksoy@albany.edu
TA's / Peer Educators	TBD
Prepared By	Mustafa Aksoy

Textbook (representative):

Antenna Theory: Analysis and Design, 4th Edition, Constantine Balanis, Wiley

COURSE DESCRIPTION / OVERVIEW

The fundamental principles of antenna theory and the application of these fundamental principles to the analysis, design and measurement of antennas. Practical antenna design examples (dipoles, loops, patches, arrays and other antennas) will be examined to introduce antenna engineering for communications.

PREREQUISITES

CEN 310 Engineering Electromagnetics

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:
At the completion of the course students will be able to:

- understand basic antenna parameters, including radiation resistance, input impedance, gain and directivity
- understand antenna radiation properties, propagation (Friis transmission formula) and wireless point to point communication connectivity requirements
- understand elementary antennas and their radiation properties
- understand to impedance matching techniques, and mutual coupling
- understand antenna arrays and array design methods.
- understand commonly used wideband antennas such as spirals and log-periodics
- understand aperture antennas such as horns and reflectors

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:
The accomplishment of course objectives will be assessed with quizzes and exams.

Exams: There will a mid-term exam and a final exam.

Quizzes: Eight quizzes will be given throughout the semester.

Grading

A final grade will be determined as a weighted average of the exam and quiz scores using the following weights:

Quizzes: 40% (Eight quizzes, each counts 5%)

Mid-term Exam: 25%
Final Exam: 35%

Grading Scale

A: 100-95 points **A-**: 94-90 points
B+: 89-87 points **B**: 86-84 points **B-**: 83-80 points
C+: 79-77 points **C**: 76-73 points **C-**: 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided on Blackboard. Students are expected to have read the listed material in the textbook before it is covered in class.

Class	Topic	Readings	Notes
	Fundamentals of Electromagnetics		
1-2	Maxwell's Equations and Boundary Conditions		
3	Complex Poynting Vector, Real and Reactive Power		
4	Potentials and Radiation Integral		
	Introduction to Antennas and Antenna Parameters		

5	Radiation from Antennas		
6-7	Radiation Resistance, Radiation Intensity, Directivity and Gain, Effective Aperture, Far-zone and Fresnel Regions		
	Elementary Antennas: Dipoles, Linear Wires, and Loops		
8-9	Dipole Antennas		
10-11	Linear Wire Antennas		
12-13	Loop Antennas		
	Antenna Array Theory		
14-16	Linear and Planar Arrays		
17-18	Phased Arrays		
19-20	Array Design Techniques		
	Antenna Examples		
21-24	Microstrip Antennas		
25-28	Aperture Antennas		

University at Albany / Electrical and Computer Engineering

Electrical Energy Systems

CEN 413 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Gary J. Saulnier
Instructor Title	Professor, ECE
Office Location	Li84A
Office hours	TBD
E-mail Address	gsaulnier@albany.edu
TA's / Peer Educators	TBD
Prepared By	Gary J. Saulnier

Textbooks:

Electrical Machinery and Power Systems Fundamentals, Stephen J. Chapman, McGraw-Hill, 2001.

COURSE DESCRIPTION / OVERVIEW:

An introduction to the major components of today's power system such as transformers, electric machines, and transmission lines. Renewable energy sources and systems are discussed, including wind and solar energy. Integration of energy sources into the power grid.

PREREQUISITES:

CEN 310 Engineering Electromagnetics and either CEN 380 Introduction to Digital Circuits or CEN 300 Introduction to Electronics

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- solve single phase and three-phase AC systems
- model and analyze single-phase and three phase transformers
- model and analyze synchronous machines
- model and analyze transmission lines
- solve simple power systems consisting of a source, transformers, transmission lines/feeders and loads
- understand the fundamentals of renewable energy sources
- describe types of energy storage systems
- understand the fundamentals of how energy sources are integrated into the power grid

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained.

ASSESSMENT AND POLICIES:

Exams: Three exams will be given.

Projects / Assignments: Weekly homework will be assigned based on the material covered during previous week.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

- Homework - 15% (lowest grade dropped)
- Exams - 75% (25% each)
- Attendance - 10%

Grading Scale

A: 100-95 points **A-**: 94-90 points
B+: 89-87 points **B**: 86-84 points **B-**: 83-80 points
C+: 79-77 points **C**: 76-73 points **C-**: 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

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(one approved by either instructor prior to class) will result in a 1-point deduction from your class participation grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

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COURSE OUTLINE AND READINGS:

Classes	**Topic**	**Readings**	**Notes**
1 - 3	Mechanical and Electromagnetic Fundamentals	Chapter 1	
4 - 8	Three-Phase Circuits	Chapter 2	
9 - 11	Transformers	Chapter 3	
12 -13	AC Machinery Fundamentals	Chapter 4	
14	Exam 1: Chapters 1 - 3		
15 - 18	Synchronous Machines	Chapters 5 & 6	
19 - 20	Induction Motors	Chapters 7 & 8	

21	Exam 2: Chapers 4 - 6		
22 - 24	Transmission Lines	Chapter 9	
25 - 27	Power Flow	Chapters 10 & 11	
28 - 30	Renewables	notes	
Finals	Exam 3: Chapers 7 – 11 + renewables		

University at Albany / Electrical and Computer Engineering

Digital ASIC Design

CEN 421

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Tolga Soyata
Instructor Title	Associate Professor, ECE
Office Location	DR 116
Office hours	TBD
E-mail Address	tsoyata@albany.edu
TA's / Peer Educators	TBD
Prepared By	Tolga Soyata

Textbooks (required):

TBD

COURSE DESCRIPTION

The design of complex digital Application Specific Integrated Circuits (ASICs). Standard cell libraries and the Verilog language are used to build complex digital synchronous circuits using Cadence layout synthesis tools. Interconnect delay estimation, clock tree synthesis, repeater and pipeline stage design are introduced. A synchronous digital circuit utilizing 100s of flip flops and digital gates is designed as a final project and sent to MOSIS for fabrication.

PREREQUISITES

CEN 420 Introduction to VLSI

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:

At the completion of the course students will be able to :

- Use multiple Cadence tools to design sophisticated digital synchronous ICs consisting of 100s of gates and flip-flops;
- Use Verilog HDL to describe their circuits,
- Use a standard cell library and automated Cadence synthesis tools,
- Design repeaters, buffers, and clock trees to handle interconnect and clock tree issues.
- Use the layout tool to use LVS, DRC, and QRC on circuits that are synthesized automatically;
- Use Hspice-based circuit analysis tool to check for the validity of the timing/power consumption of their IC;
- Apply Verilog-A - that was introduced in the Intro to VLSI - to design input vectors that are applied to the inputs of the IC;
- Perform cycle-by-cycle analysis of their synchronous operation.
- Use "design rule constraints" to direct the compiler towards desired design priorities, i.e., power, area, path delay.
- "Tape out" an IC through MOSIS fabrication.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

Since it is too difficult to post most of the Cadence examples, the Unix server directory structure will be used for students to get sample designs and to post their designs.

ASSESSMENT AND POLICIES:

The course will have five individual design projects and a final project. The students are required to work on individual projects alone, but are required to work on the final project in groups of two or three (depending on the class size). Individual projects contribute to 70% of the grade and the final project contributes to 30% of the grade.

Exams: There will be no exams for this course

Projects / Labs / Assignment: There will be 7 labs as part of the course; although they will not be graded, most of them will form the basis for the five individual projects by extending the lab and submitting the finished lab as an individual project.

Final Project: The students will be broken down into multiple groups, each group consisting of two or three students. The students will be given 2-3 options for the final project and will discuss it with their teammate for a period of a week. Before the final project, each group will present a brief "action plan" for their final project. This plan will be discussed and revised in a lecture session to help the students.

Grading

The grade of the class will be determined by five individual projects and a final project:

Labs	0%	although the labs lead to individual projects, so, implicitly included
Individual Project	70%	generally, the break-down for five projects is 10-10-15-15-20 and the complexity of the individual projects increase in time, as reflected by the grading.
Final Project	30%	
Class Participation:	0%	although participation helps student performance in individual projects

Grading Scale

A: 100-95 points	**A-** : 94-90 points	
B+: 89-87 points	**B** : 86-84 points	**B-** : 83-80 points
C+: 79-77 points	**C** : 76-73 points	**C-** : 72-70 points
D: 69-60 points		
E: 59 points and below		

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Class	Topic	Readings	Notes
	Introduction to CMOS standard cell-based design		
1	Introduction, course structure, Cadence directory structure		
2	CMOS design using standard cells		
3	Interconnect delays, repeaters, buffers		
4	Flip flops, clocking, buffering, clock tree		
	Verilog language and Cycle-by-cycle analysis/simulation		
5	Hardware description of digital circuits using Verilog		
6	Cycle-by-cycle analysis		
7	Pipelining, clock frequency, latency		
8	Synthesis of a layout		
9	NMOS, PMOS Transistor sizing		
10	Test benches : Testing the circuit using Verilog-A input vectors		
	Synchronous/combinatorial circuit synthesis examples		
11	Adder structures		
12	Multiplier structures		
13	Divider structures		
14-15	CORDIC		
16-17	ALU, FPU design		
18-20	MIPS 2000 CPU Design		
	Final Project		
21	Final project introduction, student grouping		
22	Final Project proposal by student groups		
23-27	Work on the final project		

University at Albany / Electrical and Computer Engineering

Integrated Circuit Devices

CEN 422

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	James (Randy) Moulic
Instructor Title	Professor, ECE
Office Location	DR 112
Office hours	TBD
E-mail Address	jmoulic@albany.edu
TA's / Peer Educators	TBD
Prepared By	Gary J. Saulnier

Textbooks (required):

Semiconductor Device Fundamentals, Robert F. Pierret, ISBN-13: 978-0201543933

COURSE DESCRIPTION / OVERVIEW

Modern solid state devices and their operational principles. Solid state physics fundamentals, such as carriers and their mobility, band structures, doping concentrations and PN junctions. The operation of PN diodes, PIN diodes, and Schottky diodes, as well as three terminal devices, such as BJTs, JFETs, SCRs, MESFETs and MOSFETs. Device modelling and behavior.

PREREQUISITES

CEN 280 Introduction to Circuits or CEN 202 Introduction to Circuits.

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:

At the completion of the course students will be able to:

- Calculate carrier actions
- Understand the device physics of PN Juncation diodes, Schottky Diodes, BJTs, and MOSFETs
- Calculate the terminal characteristics of semiconductor devices.
- Be able to use SPICE models for these devices and test/measure them using Cadence.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

Exams: There will midterm and final exams

Homework: Homework will be assigned weekly

Final Project: The students will be broken down into multiple groups, each group consisting of two or three students. The students will be given 2-3 options for the final project and will discuss it with their teammate for a period of a week. Before the final project, each group will present a brief "action plan" for their final project. This plan will be discussed and revised in a lecture session to help the students.

Grading

The grade for the class will be determined using the following percentages:

Midterm Exam	30%
Final Exam	30%
Homework	10%
Final Project	30%

Grading Scale

A: 100-95 points **A-** : 94-90 points
B+: 89-87 points **B** : 86-84 points **B-** : 83-80 points
C+: 79-77 points **C** : 76-73 points **C-** : 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra

efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. However, attendance will not be included in the grading, because it will be implicitly factored into the student grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

Students With Disabilities

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard.

Students are expected to have read the listed material before it is covered in class.

Class	Topic	Readings	Notes
	Introduction to Semiconductor Physics		
1	Free electrons, electron mobility		
2	Band structure		
3	Non-equilibrium in semiconductors		
4	P-N Junctions		
	Semiconductor Devices		
5	P-N Diodes		
6	PIN Diodes		
7	Schottky Diodes		
8	BJT Transistors		
9	FET Power Transistors		
10	MOSFET Power Transistors		
	Experimental Modeling and Characterization		
11	Modeling P-N Diodes		
12	P-N Diode based circuits		
14	Modeling BJTs		
15	BJT-based circuits		
17	Modeling FETs		
18	FET based circuits		
20	Power MOSFET circuits		
	Final Project		
21	Final project introduction, student grouping		
22	Final Project proposal by student groups		
23	Work on the final project		

University at Albany / Electrical and Computer Engineering

Reconfigurable Computing

CEN 431

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Jonathan Muckell
Instructor Title	Professor of Practice, ECE
Office Location	Li 81
Office hours	TBD
E-mail Address	jmuckell@albany.edu
TA's / Peer Educators	TBD
Prepared By	Tolga Soyata

Textbooks (required):

"Reconfigurable Computing, Volume 1: The Theory and Practice of FPGA-Based Computation (Systems on Silicon)," First Edition, Scott Hauck and Andre DeHon, Elsevier, ISBN-13: 978-0123705228

COURSE DESCRIPTION / OVERVIEW

This course provides a study of FPGA architecture with detailed discussion on opportunities and challenges in this flexible platform. Topics include device architecture, programming languages and models for FPGAs including streaming and I/O, Mapping, Placement and Routing in reconfigurable logic, application design, development, verification and application specific optimization techniques.

PREREQUISITES

CEN 404 Computer Organization and CEN 231 Digital Systems

COREQUISITES

None.

LEARNING OBJECTIVES / OUTCOMES:

At the completion of the course students will be able to:

- Describe various hardware devices and architectures that are used for reconfigurable computing
- Understand approaches to programming reconfigurable systems.
- Program FPGA devices using a hardware description language (HDL) and system generator (Simulink)
- Understand approaches and considerations in mapping designs onto a reconfigurable platform.
- Map designs onto an FPGA considering placement, datapath composition, and timing
- Implement and verify a design onto an FPGA

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

The course will have five individual design projects and a final project. The students are required to work on individual projects alone, but are required to work on the final project in groups of two or three (depending on the class size). Individual projects contribute to 70% of the grade and the final project contributes to 30% of the grade.

Exams: There will be no exams for this course

Projects / Labs / Assignment: There will be 7 labs as part of the course; although they will not be graded, most of them will form the basis for the five individual projects by extending the lab and submitting the finished lab as an individual project.

Final Project: The students will be broken down into multiple groups, each group consisting of two or three students. The students will be given 2-3 options for the final project and will discuss it with their teammate for a period of a week. Before the final project, each group will present a brief “action plan” for their final project. This plan will be discussed and revised in a lecture session to help the students.

Grading

The grade of the class will be determined by 2 midterm exams, laboratories, and a final project:

Midterm Exam 1	20%
Midterm Exam 2	20%

Labs	30%	although the labs lead to individual projects, so, implicitly included
Final Project	30%	

Grading Scale

A: 100-95 points **A-** : 94-90 points
B+: 89-87 points **B** : 86-84 points **B-** : 83-80 points
C+: 79-77 points **C** : 76-73 points **C-** : 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. However, attendance will not be included in the grading, because it will be implicitly factored into the student grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

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Students With Disabilities

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Class	**Topic**	**Readings**	**Notes**
	Reconfigurable Computing Hardware		
1	Device Architectures	Ch. 1	
2-3	Reconfigurable Architectures	Ch. 2	
4-5	Reconfiguration Management	Ch. 4	
	Programming Reconfigurable Systems		
6-7	Compute Models and System Architectures	Ch. 5	
8-10	Programming in VHDL	Ch. 6	
11-13	System Generation using Simulink	Ch. 8	
14	Midterm 1		
	Mapping Designs		
15	Technology Mapping	Ch. 13	
16-17	Placement for General Purpose FPGAs	Ch. 14	
18-19	Datapath Composition	Ch. 15	
20	Specifying Circuit Layout	Ch. 16	
21	Routing	Ch. 17	
22	Retiming and Repipelining	Ch. 18	
23	Midterm 2		
	Final Project		
24-28	Final Project Discussion & Presentations		

University at Albany / Electrical and Computer Engineering

Cyber-Physical Systems

CEN 453 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Dola Saha
Instructor Title	Assistant Professor, ECE
Office Location	Li 89B
Office hours	TBD
E-mail Address	dsaha@albany.edu
TA's / Peer Educators	TBD
Prepared By	Dola Saha

Textbooks:

Introduction to Embedded Systems - A Cyber-Physical Systems Approach, Second Edition
E. A. Lee and S. A. Seshia
MIT Press
ISBN-13: 978-1312427402

COURSE DESCRIPTION / OVERVIEW:

This course is an introduction to the basics of models, analysis tools, and control for embedded systems operating in real time. Topics include models of computation, basic analysis, control, and systems simulation, interfacing with the physical world, mapping to embedded platforms and distributed embedded systems. This course has a lab component.

PREREQUISITES:

ICEN 350/371 Signals & Systems and ICEN 404 Computer Organization.

COREQUISITES:
None

LEARNING OBJECTIVES / OUTCOMES:
At the completion of the course students will be able to:

1. Utilize models of computation: finite state machines, threads, ordinary differential equations, hybrid systems, actors, discrete-events, data flow
2. Perform basic analysis, control, and systems simulation: Bisimulations, reachability analysis, controller synthesis, approximating continuous-time systems.
3. Interface systems with the physical world: sensor/actuator modeling and calibration, concurrency in dealing with multiple real-time streams, handling numerical imprecision in software
4. Map solutions to embedded platforms: real-time operating systems, execution time analysis, scheduling, concurrency
5. Perform distributed embedded system design: Protocol design, predictable networking, security

COURSE WEBSITE AND BLACKBOARD:
Course website will provide syllabus, slides covered in class and class progress. Blackboard will be used to provide assignment documents and solutions. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:
The accomplishment of course objectives will be assessed by applying the concepts and tools of Computer Networks in a combination of individual assignments and exams.

Exams: One midterm exams plus a final exam will be given. A portion of the class period preceding each exam will be utilized for a review session. It is highly recommended that computer assignments be done in C or Python.

Assignments: Four homework assignments will be assigned and will be completed out of class.

Projects: Four project assignments will be assigned and will be completed out of class.

Grading
A final grade will be determined as a weighted average of these scores using the following weights:
Labs - 10%
Homework – 10%
Midterm 1 - 20%
Midterm 2 - 20%
Final Exam - 20%
Final Project – 20%

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of coursework to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Grading Scale

Final letter grades will be based on your score computed as below.

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Email

When sending the professor an email you must use proper business etiquette. Do not expect her/him to respond to emails that do not have the name of the person and class info from the person who sent it. We also choose to not respond to emails that are not written properly. Re-read what you write before you hit send. The subject line of the email should contain the class number, i.e. containing [5xx] in your subject.

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Computers and phones may NOT be used during class. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

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website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage http://www.albany.edu/disability/faculty-staff.shtml.

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CAUTION AND A STRONG WORD OF WARNING!!!! Plagiarism and other acts of academic dishonesty will be punished. Students are expected to submit original work. While you may discuss a problem with another student, the work you submit must be your own. Any student who submits copied work from the Internet or any other student and any student that provides work for copying will earn a zero grade for that assignment. If there is more than one copying incident, the student will be graded an E for the class. As per college policy, cheating activity, including cheating in exams, quizzes, projects, etc, WILL be written up in a Violation of Academic Integrity Report (VAIR) reported to the college administration, which includes the Computer Science Chair, the College of Engineering and Applied Sciences Dean, and the Vice Provost of Undergraduate Studies. This will become a part of your permanent record. Multiple incidents will result in being expelled from the college.

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The specific assignments will be provided in Blackboard.

Class	Topic	Readings	Notes
	Introduction		
1	Course Overview, Cyber Physical Systems		
2	Sensors and Actuators		
3	Model Based Design, Continuous Dynamics		
4	Memory Architectures		

5	Input and Output		
6	Modeling Modal Behavior		
7	Discrete Dynamics		
8	Extended and Timed Automata		
9	Composition of State Machines		
10	Hierarchical State Machines		
11	Specification, Temporal Logic		
12	Comparing State Machines		
13	Reachability Analysis		
14	Multitasking		
15			
16	**Midterm 1 in Class**		
17	Operating Systems, Microkernels		
18	Scheduling		
19			
20	Project Update in Class		
21	Scheduling Anomalies		
22	Execution Time Analysis		
23			
24	**Final Exam in Class**		
25	Synchronous/Reactive and Dataflow Models		

26	Security for Embedded Systems		
27	Networked Embedded Systems		
28	**Final Project Presentations**		

University at Albany / Electrical and Computer Engineering

Digital Image Processing

CEN 463 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Kim Boyer
Instructor Title	Professor, ECE
Office Location	DR 115
Office hours	TBD
E-mail Address	kboyer@albany.edu
TA's / Peer Educators	TBD
Prepared By	Ming-Ching Chang

Textbooks (required):

Introduction to Video and Image Processing
Moeslund, Thomas B. (Author)
ISBN-13: 978-1-4471-2503-7 (2012)

COURSE DESCRIPTION / OVERVIEW

An introduction to Digital Image and Video Processing. The course starts with an introduction of digital image processing. It continues with fundamentals of video processing, and covers closely related topics in computer vision. The course focuses on both the theory and the practical application of digital image and video processing. Students will learn hands-on programming implementation using Python, Matlab, or C++.

PREREQUISITES

CEN 141/200 Programming for Engineers and CEN 370/462 Digital Signal Processing

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:

At the completion of the course students will be able to:

- Apply digital image and video processing basics such as image acquisition, color representation, filtering, morphology, geometric transformation, camera calibration, segmentation, registration, optical flow, and tracking.
- Understand and build up fundamentals for advanced areas including computer vision, computer graphics, multimedia, and robotics.
- Implement practical image/video processing systems using Python, Matlab, or C++.

COURSE WEBSITE AND BLACKBOARD:
Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the concepts and tools for digital image and video processing in a combination of team and individual assignments and tests.

Exams: Two exams plus a final will be given. A portion of the class period preceding each exam will be utilized for a review session.

Projects / Assignments: Projects / assignments will be assigned and will be completed out of class. They will be graded on a 10-point scale and will be totaled together to account for 40% of the final grade.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Exams (2) 30% (15 points each)

Final Exam 25% (25 points)

Projects/assignments (4) 40% (10 points each)

Class Participation: 5%

Total possible points = 100

Grading Scale
A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points

D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 1-point deduction from your class participation grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see

http://www.albany.edu/health_center/medicalexcuse.shtml.

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COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Class	Topic	Readings	Notes
	Introduction to Digital Image and Video Processing		
1	Intro to Course Intro to Image/Video Processing		
2			
3	Introduction	Chapter 1	
4			
5	Image Acquisition	Chapter 2	
6			
7	Color Images	Chapter 3	Proj./Assignment 1 Due
8			
9	Point Processing	Chapter 4	
10			Proj./Assignment 2 Due
11	Neighborhood Processing	Chapter 5	
12			
13	Test 1		
14	Morphology	Chapter 6	
15			
16	Blob Analysis	Chapter 7	
17			Proj./Assignment 3 Due
18	Segmentation in Video Data	Chapter 8	
19			
20	Tracking	Chapter 9	
21			Proj./Assignment 4 Due
22	Geometric Transformations	Chapter 10	
23			
24	Test 2		
25	Visual Effects	Chapter 11	
26			
27	Applications / Summary	Chapter 12	
	Final Exam		

University at Albany / Electrical and Computer Engineering

Communication Systems

CEN 471 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Gary J. Saulnier
Instructor Title	Professor, ECE
Office Location	Li 84A
Office hours	TBD
E-mail Address	gsaulnier@albany.edu
TA's / Peer Educators	TBD
Prepared By	Gary J. Saulnier

Textbooks:

Digital and Analog Communication Systems, 8th Edition by Leon W. Couchi

COURSE DESCRIPTION / OVERVIEW:

An introduction to analog and digital communication signals and systems. Representation of analog and digital signals and their spectra. Baseband pulse and digital signaling, including PAM, PCM, DM and DPCM. Bandlimited signaling without inter-symbol interference. Analog and digital bandpass signaling, including AM, FM, PM, OOK, PSK, FSK, MSK, QAM and OFDM. Transmitter and receiver operations and systems. Performance in the presence of noise.

PREREQUISITES:

CEN 350/371 Signals and Systems and AMAT 370 Probability and Statistics for Engineering and the Sciences

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: At the completion of the course students will be able to:

- Apply mathematical tools to the analysis of communication systems
- Represent analog and digitally modulated signals in the time and frequency domains
- Determine transmitter and receiver structures and parameters to meet desired specifications
- Evaluate the performance of modulations in additive white Gaussian noise

COURSE WEBSITE AND BLACKBOARD:
Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

Exams: 3 exams will be given.

Projects / Assignments: Weekly homework will be assigned based on the material covered during previous week.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

- 3 exams at 30% each: 90%
- Homework: 10%

Grading Scale
A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

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Responsible Computing

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Students With Disabilities

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http://www.albany.edu/disability/faculty-staff.shtml.

Academic Honesty and Overall Regulations

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

Class	Topic	Readings	Notes
1	Review of Signals, Spectra, and Linear Systems	Chapter 2	
2			
3			

4			
5	Baseband Pulse and Digital Signaling	Chapter 3	
6			
7			
8			
9			
10	Review Lecture		
11	Exam 1		
12	Bandpass Signaling Principles and Systems	Chapter 4	
13			
14			
15	Analog Bandpass Modulations	Chapter 5	
16			
17			
18	Review Lecture		
19	Exam 2		
20	Digital Bandpass Modulations	Chapter 5	
21			
22			
23			
24	Performance in Noise	Chapters 6, 7	
25			
26			
27			
28	Review Lecture		
	Quiz 3 (Finals Week)		

University at Albany / Electrical and Computer Engineering

Advanced Digital Communications

CEN 472 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Aveek Dutta
Instructor Title	Assistant Professor, ECE
Office Location	Li 89A
Office hours	TBD
E-mail Address	adutta@albany.edu
TA's / Peer Educators	TBD
Prepared By	Aveek Dutta

Textbooks:

Digital Communications, 5th Edition 5th Edition by John Proakis, Masoud Salehi

COURSE DESCRIPTION / OVERVIEW:

An introduction to digital communications, including signal generation, signal detection, synchronization, channel modeling, and coding. Baseband pulse modulation. Signal space representation of signals and optimal receiver structures. Bandpass modulation techniques including PSK, QAM and FSK. Carrier, symbol, and frame synchronization. Channel characterization and modeling, including terrestrial channels. Error control coding.

PREREQUISITES:

CEN 471 Communication Systems and AMAT 370 Probability and Statistics for Engineering and the Sciences

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: At the completion of the course students will have:

- an ability to design optimal communication receivers
- an ability to determine the performance of baseband and passband digital modulations
- an ability to design and evaluate the performance of synchronization systems
- an ability to evaluate link budgets for satellite and terrestrial channels
- an understanding of basic error-control coding

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

Exams: A mid-term and final exam will be given.

Projects / Assignments: Weekly homework will be assigned based on the material covered during previous week.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

- Homework - 25%
- Midterm - 25%
- Final Exam - 40%
- Attendance and class participation - 10%

Grading Scale
A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per

department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 1-point deduction from your class participation grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

Students With Disabilities

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

Class	Topic	Readings	Notes
	Introduction		
1	Building blocks of Digital Communication systems		
2			
	Communication Sources		
3	Source coding and Compression		
4			
5			
6	Sampling and Quantization		
7			
8			
	Channels, modulation and Demodulation		
9	Constellation, Intersymbol Interference, Eye diagram, pulse shaping, adaptive equalization, partial response signaling		
10			
11			
12			
	Optimal Receiver Design		
13	Matched filter, bit error rate, coherent and noncoherent receivers, Synchronization		
14			
15			
16			
	Midterm Exam		
	Random processes and noise		
17	Baseband and Passband representation of noise, Signal to noise ratio, Stationarity		
18			

19			
20			
	Channel coding		
21	Channel coding theorem, Block codes, Convolution Codes, Viterbi decoder.		
22			
23			
	Wireless Digital Communications and Networks		
24	Wireless channels and Waveforms. Multicarrier Communication		
25			
26	Wireless Networks - from link to network		
27			
28	Final Exam Review		
	Final Exam		

University at Albany / Electrical and Computer Engineering

Radio Wave Propagation and Remote Sensing

CEN 473

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Mustafa Aksoy
Instructor Title	Assistant Professor, ECE
Office Location	Li 91A
Office hours	TBD
E-mail Address	maksoy@albany.edu
TA's / Peer Educators	TBD
Prepared By	Mustafa Aksoy

Textbook (representative):

Radiowave Propagation: Physics and Applications, Levis, Johnson and Teixeira, Wiley

COURSE DESCRIPTION / OVERVIEW

In this course the basic physical mechanisms of electromagnetic wave propagation in the troposphere and ionosphere, and the fundamentals of microwave remote sensing will be studied. Theoretical and empirical models which describe several propagation mechanisms will be discussed to understand the design and analysis of communications and remote sensing (radar and radiometer) systems.

PREREQUISITES

CEN 310 Engineering Electromagnetics and CEN 350/371 Signals and Systems

COREQUISITES

None

LEARNING OBJECTIVES / OUTCOMES:
At the completion of the course students will be able to:

- Apply analytical and empirical methods for predicting the propagation of electromagnetic waves in the atmosphere over a wide range of frequencies
- Understand the basic remote sensing concepts and systems
- Understand the operation and tradeoffs of radar and radiometer systems

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:
The accomplishment of course objectives will be assessed with quizzes and exams.

Exams: There will a mid-term exam and a final exam.

Quizzes: Eight quizzes will be given throughout the semester.

Grading

A final grade will be determined as a weighted average of the exam and quiz scores using the following weights:

Quizzes: 40% (Eight quizzes, each counts 5%)
Mid-term Exam: 25%
Final Exam: 35%

Grading Scale

A: 100-95 points **A-**: 94-90 points
B+: 89-87 points **B**: 86-84 points **B-**: 83-80 points
C+: 79-77 points **C**: 76-73 points **C-**: 72-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. The scale is a template for the "minimum" final grade and the instructor may modify the scale slightly based on the grade distribution in the class. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to attend every class and to arrive on time. However, attendance will not be included in the grading, because it will be implicitly factored into the student grade. Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see

http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided on Blackboard. Students are expected to have read the listed material in the textbook before it is covered in class.

Class	Topic	Readings	Notes
	Fundamentals of Electromagnetics		
1-2	Maxwell's Equations and Boundary Conditions		
3	Plane Waves and Antenna Properties		
	Direct Transmission		
4	Friis Transmission Formula		
5	Attenuation due to Atmospheric Gases		
6	Attenuation due to Rain		
	Reflection and Refraction		
7	Reflection from a Planar Interface		
8	Refraction in a Stratified Medium and over a Spherical Earth		
9	Ducting and Ray Tracing		
	Path Loss and Fading Models		
10-11	Empirical Path Loss Models		
12-13	Signal fading		
	Groundwave Propagation		
14-15	Planar Earth Groundwaves		
16-17	Spherical Earth Groundwaves		
	Ionospheric Propagation		
18-19	Ionospheric Basics		
20-21	Vertical and Oblique Ionospheric Propagation		
	Remote Sensing Ststems		
22-24	Radar Remote Sensing		
25-27	Microwave Radiometry		

University at Albany / Electrical and Computer Engineering

Linear Control Theory

CEN 481 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Daphney-Stavroula Zois
Instructor Title	Assistant Professor, ECE
Office Location	Li 88A
Office hours	TBD
E-mail Address	dzois@albany.edu
TA's / Peer Educators	TBD
Prepared By	Daphney-Stavroula Zois

Textbooks:

Modern Control Systems **(required)**

Richard C. Dorf, Robert H. Bishop

12th Edition. Upper Saddle River, NJ: Prentice-Hall

ISBN: 978-0-136-02458-3

COURSE DESCRIPTION / OVERVIEW:

An introduction to the analysis and design of linear control systems. Mathematical models, including state variable models. Feedback control, and stability. Root locus and frequency response compensation methods.

PREREQUISITES:

CEN 350/371 Signals and Systems

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: At the completion of the course students will be able to:

- analyze linear control systems
- model various problems as continuous and sampled-data systems
- use and evaluate various stability criteria
- use root locus compensation techniques whenever necessary

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

The accomplishment of course objectives will be assessed by applying the concepts and tools of Linear Control Theory in a combination of individual assignments and exams.

Exams: One midterm exam plus a final exam will be given. A portion of the class period preceding each exam will be utilized for a review session.

Projects / Assignments: Homework assignments will be assigned and will be completed out of class. It is highly recommended that computer assignments be done in Matlab - however, other programming languages (e.g. C/C++, Python) may also be acceptable with the permission of the instructor. A project will be assigned at the beginning of the course and will need to be completed by the end of the course.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

10% Homeworks
40% Midterm Exam
45% Final Exam
5% Class Participation

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of coursework to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Class	Topic	Readings	Notes
	Introduction		
1	Perspective, Examples of typical control problems		
2	Laplace transformation models		
	Feedback systems		
3	Feedback system characteristics (sensitivity reduction, transient response control, noise attenuation, steady-state error improvement, definitions, examples)		Homework 1 Due
4	Feedback system performance specifications (steady-state, transient response, parameter variation tolerance, noise tolerance, compromise design)		
	Two-dominant-pole Model		
5	Damping ratio, Natural frequency, Relationships of pole locations to transient spec, Model order reduction by partial fraction expansion, Justification of the two-dominant-pole assumption		Homework 2 Due
	Miscellaneous		
6	Steady-state error, final-value theorem, performance indices, Introduction to the concept of stability		
	Stability		
7	Relation to pole location, Routh-Hurwitz stability criterion		Homework 3 Due
	Root locus		

8	The concept of root-locus, Relation to open-loop pole-zero plot, Phase angle and magnitude conditions.		
9	Asymptotic behavior for large and small gain, Behavior on real axis		Homework 4 Due
10	Root locus behavior at break-away points		
11	Sketching examples		Homework 5 Due
12	Parameter variation analysis, Root sensitivity		
	Frequency response model		
13	Relation to open-loop pole-zero plot		Homework 6 Due
14	Procedures for sketching Bode plot given the pole-zero plot, Determination of transfer function from Bode plot		
15	Concepts of minimum and non-minimum phase systems, Two-dominant-pole system, Resonant peak and resonant frequency, Relation to damping ratio and natural frequency		Homework 7 Due
16	Midterm Exam		
	Performance specs in the frequency domain		
17	Determination of transient properties (rise-time, etc.) from a closed-loop frequency response, Determination of steady-state error from open-loop frequency response		Homework 8 Due
	Nyquist stability criterion		
18	Cauchy's "principle of the argument" and the proof of the Nyquist criterion		
19	Procedures for handling imaginary-axis poles		Homework 9 Due
	Gain and phase margin		
20	Definition and interpretation, Relation to damping ratio of dominant closed-loop poles		
	M-circles		

21	Derivation, Relation to damping ratio of dominant closed-loop poles, Nichols' chart		Homework 10 Due
	Compensation		
22	Root-locus approach		
23	Frequency response approaches using Bode plot and Nichols' chart		Homework 11 Due
24	Examples		
25	Examples		Homework 12 Due
	Robust Control Systems		
26	Uncertain models and parameter variation, QFT, Small gain theorem		
27	H-infinity optimal loop-shaping		Homework 13 Due
28	Review		
	Final Exam		

University at Albany / Electrical and Computer Engineering

Design Lab I

CEN 490 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Jonathan Muckell
Instructor Title	Professor of Practice, ECE
Office Location	Li 081
Office hours	TBD
E-mail Address	jmuckell@albany.edu
TA's / Peer Educators	TBD
Prepared By	Jonathan Muckell/Gary J. Saulnier

Textbooks:

Design for Electrical and Computer Engineers. Theory, Concepts and Practice. By Ralph Ford and Chris Coulston. 2007. ISBN-13: 978-0073380353

Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. By Tim Brown. 2009. ISBN-13: 978-0062337382

COURSE DESCRIPTION / OVERVIEW:

Part one of a two-semester-long capstone design experience that provides the opportunity for teams of students to propose, prototype/design, build, test, demonstrate, present and fully document a working prototype of a sophisticated electronic system. In this first part, student teams interact with industry sponsors and/or faculty to develop a proposal for a system, component or process to meet desired needs and specifications within constraints. Students teams will identify opportunities, develop requirements,

perform analysis and synthesis, generate multiple solutions, evaluate solutions against requirements, consider risks, and make trade-offs.

PREREQUISITES:

CEN 350/371 Signals and Systems, CEN 380 Introduction to Digital Circuits or CEN 300 Introduction to Electronics, and CEN 333 Programming at the Hardware/Software Interface.

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES: At the completion of the course students will have:

- An ability to develop practical, creative ideas to solve organization problems by treating innovation as a design process.
- An ability to employ information gathering skills to develop requirements consistent with the stakeholder's mission.
- The oral and writing communication skills needed to describe proposed engineering solution(s) and the relevance of the solution to meeting organizational requirements/objectives.
- An ability to work as a member of a team, effectively collaborating and balancing varying skillsets to meet deliverables and craft solutions.
- An ability to apply technical, mathematical and engineering competencies to review prior work, identify gaps in current solutions, and craft a useful, unique solution balancing resource constraints.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

Grading

A final grade will be determined as a weighted average of scores as shown in the table below:

Grading Component	Weight
Professionalism: Defined as a student who is reliable, self-motivated, on-time, attends and participates in class. Student handles communication with stakeholders in a respectful, thorough, and diligent manner. Student is a dedicated team member as evidence by class performance and anonymous team evaluations. Overall, the student is a model representative of the student team, department and university.	**10%**
Presentations: Every student will give numerous presentations throughout the semester (both individually and in teams). Presentations should be well-organized and researched.	**30%**
Design Proposal Draft #1: Early draft reviewed by the instructor. Feedback will be given to allow for improvements before sending off for stakeholder review	**10%**
Design Proposal Draft #2: Well written proposal. Changes recommend by the instructor have been integrated into the proposal. This version will be reviewed by an outside stakeholder. Feedback will be given for final version of design proposal.	**10%**

Final Design Proposal: This is your final integrating all changes. High expectations are expected for the final draft. All suggested changes indicated by the instructor and external stakeholder should be integrated into the final document.	**40%**
TOTAL	**100%**

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of coursework to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance/Lateness/Use of Computers in class

Students are expected to *attend every class and to arrive on time*. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 1-point deduction from your class professionalism grade. Laptops and other personal devices may be helpful for accessing reading assignments or other in-class activities. Out of respect for your classmates and to fully engage in class activities, please refrain from e-mailing, gaming, surfing the web or any other activities that can be distracting to your peers. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

Responsible Computing

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

Students With Disabilities

Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Director of the Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage

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(http://www.albany.edu/undergraduate_bulletin/regulations.html).

Plagiarism

Presenting as one's own work the work of another person (for example, the words, ideas, information, data, evidence, organizing principles, or style of presentation of someone else). Plagiarism includes paraphrasing or summarizing without acknowledgment, submission of another student's work as one's own, the purchase of prepared research or completed papers or projects, and the unacknowledged use of research sources gathered by someone else. Failure to indicate accurately the extent and precise nature of one's reliance on other sources is also a form of plagiarism. The student is responsible for understanding the legitimate use of sources, the appropriate ways of acknowledging academic, scholarly, or creative indebtedness, and the consequences for violating University regulations.

Examples of plagiarism include: failure to acknowledge the source(s) of even a few phrases, sentences, or paragraphs; failure to acknowledge a quotation or paraphrase of paragraph-length sections of a paper; failure to acknowledge the source(s) of a major idea or the source(s) for an ordering principle central to the paper's or project's structure; failure to acknowledge the source (quoted, paraphrased, or summarized) of major sections or passages in the paper or project; the unacknowledged use of several major ideas or extensive reliance on another person's data, evidence, or critical method; submitting as one's own work, work borrowed, stolen, or purchased from someone else.

Plagiarism will not be tolerated! Intentional or blatant plagiarism will cause the student to receive a zero for the assignment and a Violation of Academic Integrity report to be submitted to the appropriate university departments. Acts of plagiarism that are limited and less serve will receive a grade penalty on the assignment up to -50% of the grade for the first offense. The second offense will cause the student to receive a zero for the assignment and a violation of academic integrity report to be filed with the appropriate university departments.

COURSE OUTLINE AND READINGS:

Design Lab I (Fall 2017) Course Schedule

Class #	Day	Date	Topic / Reading	DUE

1	M	Aug. 28th	Course Introduction / Getting Started	
2	W	Aug. 30th	**READING**: Chapter #1 (Ford): The Engineering Design Process **Student Presentations:** Previous CREATE projects	Presentation Sign UP: _____ Presentation Sign UP: _____ Presentation Sign UP: _____
-----	M	Sept. 4th	**----------NO CLASS, LABOR DAY----------**	
3	W	Sept. 6th	**Guest Speakers:** NYSID CREATE Leadership	
4	M	Sept. 11th	**READING**: Chapter #2 (Ford): Project Selection and Needs Identification **Student Presentations:** Previous CREATE projects	Presentation Sign UP: _____ Presentation Sign UP: _____ Presentation Sign UP: _____
-----	W	Sept. 13th	**----------NO CLASS, Rosh Hashanah----------**	
5	M	Sept. 18th	**READING**: Change by Design Chapter #1: How Design Thinking is more than style **Student Presentations:** Project Need Identification	Be Ready to Present
6	W	Sept. 20th	**READING**: Chapter #3 (Ford): The Requirements Specification	
7	M	Sept. 25th	**READING**: Change by Design Chapter #2 Converting Need into Demand	Presentation Sign UP: _____
8	W	Sept. 27th	**Student Presentations:** Design Requirements	Be Ready to Present
9	M	Oct. 2nd	**READING:** Chapter #4 (Ford): Concept Generalization and Evaluation **Student Presentation:** Literature / Example of Related Work	Presentation Sign UP: _____ Presentation Sign UP: _____ Presentation Sign UP: _____
10	W	Oct. 4th	**READING:** Change by Design (Chapter #3) These people have no process **Student Presentation:** Literature / Example of Related Work	Change by Design Presentation Sign UP:_____ Presentation Sign UP: _____ Presentation Sign UP: _____ Presentation Sign UP: _____

11	M	Oct. 9th	**GUEST SPEAKER – TBD**	
12	W	Oct. 11th	**Student Presentations:** Concept Pitches	Be Ready to Present
13	M	Oct. 16th	**Student Presentations:** Concept Pitches	Be Ready to Present
14	W	Oct. 18th	**READING**: Chapter #5 (Ford): System Design I – Functional Decomposition	**Research Statement DUE**
15	M	Oct. 23rd	**GUEST SPEAKER – TBD**	
16	W	Oct. 25th	**READING**: Chapter #6 (Ford): System Design II – Behavior Models	
17	M	Oct. 30th	**Student Presentations:** Proposal Draft	**PROPOSAL DRAFT #1** Reviewed by instructor (team assignment) ---Be Ready to Present---
18	W	Nov. 1st	Critique and peer review of Proposal Drafts	
19	M	Nov. 6th	**GUEST SPEAKER – TBD**	
20	W	Nov. 8th	**Student Presentations:** Proposal Draft / Concept Design	**PROPOSAL DRAFT #2** Reviewed by NYSID (team assignment due Friday) ---Be Ready to Present---
21	M	Nov. 13th	Critique and Peer Review of Proposal Drafts	
22	W	Nov. 15th	**Reading: Change by Design** **Chapter #3 – These people have no process** **Student Presentations:** Emerging Trends	Presentation Sign UP: _____ IoT Sign UP: _____ VR Sign UP: _____ Gamification Sign UP: _____
-----	M	Nov. 20th	**----------NO CLASS, THANKSGIVING----------**	
-----	W	Nov. 22nd	**----------NO CLASS, THANKSGIVING----------**	
23	M	Nov. 27th	**Reading: Change by Design** **Chapter #4 – The Power of Prototyping** **Student Presentations:** Emerging Trends	Presentation Sign UP: _____ Wearables Sign UP: _____ Smart Homes Sign UP: _____
24	W	Nov. 29th	**GUEST SPEAKER – TBD**	

25	M	Dec. 4th	**Reading: Change by Design** **Chapter #5 – The Design of Experiences** Finalizing proposals and budget Plans for Spring	Presentation Sign UP: _____
26	W	Dec. 6th	**Reading: Change by Design** **Chapter #6 – Importance of Storytelling** Finalizing proposals and budget Plans for Spring	FINAL PROPOSAL DUE (team assignment) Presentation Sign UP: _____
27	M	Dec. 11th	**PROPOSAL / DESIGN PRESENTATIONS** Department faculty and students will be invited to join to give feedback	Be ready to present

University at Albany / Electrical and Computer Engineering

Design Lab II

ECE 491 Section xxxx

Credits: 3

Term/Year

Meeting Time: TBD

This course will meet 165 minutes/week

Location: TBD

Instructor	Jonathan Muckell
Instructor Title	Professor of Practice, ECE
Office Location	Li 081
Office hours	TBD
E-mail Address	jmuckell@albany.edu
TA's / Peer Educators	TBD
Prepared By	Jonathan Muckell/Gary J. Saulnier

Textbooks:

None

COURSE DESCRIPTION / OVERVIEW:

Part two of a two-semester-long capstone design experience that provides the opportunity for teams of students to propose, prototype/design, build, test, demonstrate, present and fully document a working prototype of a sophisticated electronic system. In this second part, student teams continue to interact with industry sponsors and/or faculty as they implement their design and conduct validation experiments to demonstrate that their design meets all engineering specifications, standards, and constraints. In documenting their work, student teams will also evaluate their designs in global, cultural, social, environmental, and economic context and develop recommendations for future development.

PREREQUISITES:

CEN 440 Design Lab I or CEN 490 ECE Design Lab I

COREQUISITES:

None

LEARNING OBJECTIVES / OUTCOMES:

1. Students will develop practical, creative ideas to solve organization problems by treating innovation as a design process.
2. Students will employ information gathering skills to develop requirements consistent with the stakeholder's mission.
3. Students will develop oral and writing communication skills to describe proposed engineering solution(s) and the relevance of the solution to meeting organizational requirements/objectives.
4. Working as a member of a team, students will effectively collaborate to balance varying skillsets to meet deliverables and craft solutions.
5. Students will apply technical, mathematical and engineering competencies to review prior work, identify gaps in current solutions, and craft a useful, unique solution balancing resource constraints.

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES:

Grading

A final grade will be determined as a weighted average of scores as shown in the table below:

GRADING COMPONENT	WEIGHT
Professionalism: Defined as a student who is reliable, self-motivated, on-time, attends and participates in class. Student handles communication with stakeholders in a respectful, thorough, and diligent manner. Student is a dedicated team member as evidence by class performance and anonymous team evaluations. Overall, the student is a model representative of the student team, department and university.	**10%**

Presentations: There will be three team presentations due towards the end of the semester. • **Video Presentation:** Short, high quality video presentation meeting NYSID CREATE guidelines. Video will be shared on their website. • **NYSID CREATE Symposium:** Presentation at the CREATE symposium on *Wednesday, April 25, 2018* at the Legislative Office Building in Albany • **University Department Presentation:** Presentation at the end of the semester to external stakeholders and invited guests from the ECE department.	**30%**
Prototype Implementation: Steady progress should be made each week on implementing prototype requirements. Every student will give a short, written progress report each week, focusing on three parts (1) what was accomplished last week, (2) what are your priorities for the upcoming week and (3) identify any problems that should be discussed as a team. Grade will be based on individual contributions to the team effort based on progress reports, successfully implementation of requirements and anonymous team evaluations.	**60%**
Total	**100%**

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Implementation Timeline:

Timeline for implementation and development of this prototype is based on the following schedule outlined in the Design Lab I proposal.

Bee Notified Timeline	Start	End
Bee Notified Alpha V1	**01-23-18**	**02-16-18**
Implement add calendar events requirement	01-23-18	02-07-18
Implement reminders requirement	02-06-18	02-14-18
Testing	02-14-18	02-16-18
Bee Notified Alpha V2	**02-14-18**	**03-16-18**
Implement arrival at designated location requirement	02-14-18	03-02-18
Implement location request requirement	03-02-18	03-14-18
Testing	03-14-18	03-16-18
Bee Notified Alpha V3	**03-16-18**	**04-18-18**
Implement communication through the application requirement	03-16-18	04-04-18
Implement setting client record(s)/log(s) requirement	03-28-18	04-16-18
Finalizing/Debugging	04-16-18	04-18-18
Beta	**04-09-18**	**04-25-18**
Final prototype	04-18-18	04-25-18
Deliverable demo video	04-09-18	04-25-18

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COURSE OUTLINE AND READINGS:

The focus of this course is to develop and test a prototype of your design. As such, all class meeting time is devoted to working on your project.

University at Albany / Computer Science
Systems Programming
CSI 402 Section 1
Credits: 3
Spring 2018

Meeting Time: Tuesday/Thursday 2:45pm – 4:05pm
This course will meet 160 minutes/week
Location: ES 241

Instructor	Amir Masoumzadeh
Instructor Title	Assistant Professor, CSI
Office Location	UAB 422
Office hours	TBD
E-mail Address	cchelmis@albany.edu
TA's / Peer Educators	TBD
Prepared By	

Textbooks:
There is no single textbook that covers everything discussed in this course. Therefore, we rely on multiple online resources (books, articles, and tutorials) which are available publicly or via the University's network. You are required to read each session's readings listed on the schedule before attending the class.

COURSE DESCRIPTION / OVERVIEW:
An introduction to engineering, including problem solving and other skill sets essential for engineers. Using a combination of assignments and classroom lectures and presentations, students will learn how to formulate, articulate, and solve engineering problems, and how to present engineering work in written form. Students will learn about the different disciplines within engineering and the multidisciplinary nature of modern engineering. Students will gain a better understanding of how fundamental scientific principles relate to engineering. This course introduces students to the programming aspects of operating systems. Topics covered include implementation of storage management, resource allocation, multi–processing, scheduling, synchronization, inter– process communication, and terminal I/O. Programming assignments are designed to enhance subject understanding, problem solving, and programming skills through hands–on experience on real–life–like problems.

PREREQUISITE/COREQUISITE:
ICSI/ICEN 333 or equivalent with a grade of at least C. You are expected to have a good knowledge of programming basics, C and Assembly programming.

LEARNING OBJECTIVES / OUTCOMES: After completing the course, students will be able to:

- understand and articulate what system software does code general-purpose C programs
- use the many tools Linux provides including commands and system calls
- understand and talk about system details (e.g., be able to read research papers in systems area)

COURSE WEBSITE AND BLACKBOARD:

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance is essential and required.

ASSESSMENT AND POLICIES:

Homework Assignments

These will be mainly programming assignments. There will be about 8 homework assignments during the semester.

In-Class Activities and Performance

A major component of your participation in the course will be involvement in class activities and discussions (both individually and in a team). Because your work in your teams is crucial to your success in this course as well as your teammates, you will be held accountable for your contribution to your team. Your team members will give you feedback on your performance during the semester.

Exams

There will be 4 exams in total. The first 3 exams each will be on one of the Modules #1–#3. The last exam, during the finals exam week, will be 50% on Module #4 and 50% cumulative on all modules.

Final Grade

Final grade will be a weighted combination of 35% homework assignments, 15% in-class assignments, and 50% exams.

Makeup Policy

There are generally no makeup opportunities for missed activities and assignments except in extenuating circumstances. Since there will be occasions in your life when missing a class meeting or a deadline is simply unavoidable, this course has a few built-in safety valves.

1. You can submit your assignment up to 2 days late subjecting to 10% penalty per day late. No assignment will be accepted after 2 days past the deadline. Important Note: For late submissions, you must email (instructor and TAs) once before the deadline informing us about the late submission and once immediately after your submission so that we can grade it for you.
2. The average of the best 90% of your in-class activities will count towards your grade.
3. If you become seriously ill during the semester, or become derailed by unforeseeable life problems, and have to miss so many assignments that it will ruin your grade, schedule a meeting with me in order to make arrangements for you to drop the course to save your grade point average. Do not wait until it is too late to see me when you get in trouble.

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

The instructor may choose to re-curve the distribution, in favor of students.

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per

department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Timely Assessment

Patterns of testing, assignments, and examinations vary widely across departments and courses. It is important, however, that students in all courses be provided with assessment of their progress in a timely way. Students will receive some formal assessment of their progress well before the last date to withdraw from a course.

Student Conduct

Student and staff/faculty interactions in the class room and other on-campus environments are expected to be professional and cordial. Disruptive behavior in the class room may be treated by the instructor as a violation of the U Albany Student Code of Conduct, and subject to a formal Student Conduct Referral.

Attendance/Lateness/Use of Computers in class

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Title IX

The University at Albany recognizes that an in order to maintain a healthy, safe, and vibrant living and learning community, it must continue to foster an environment free from gender inequality and sexual violence. In furthering its commitment to that cause, the University has appointed a full time administrator to ensure our realization of this important agenda. Further information can be found at the following U Albany url:
http://www.albany.edu/titleIX/indexmain.php

Academic Integrity

It is every student's responsibility to become familiar with the standards of academic integrity at the University. Claims of ignorance, of unintentional error, or of academic or personal pressures are not sufficient reasons for violations of academic integrity. Any incident of academic dishonesty can result in (i) no credit for the affected assignment, (ii) report to the appropriate University authorities (e.g., Dean of Undergraduate Education or Graduate Studies), and/or (iii) a failing grade (E) for the course.

For all assignments and papers, make sure to do your own work, except where collaboration is explicitly permitted or required. Also, make sure that you properly cite any resource from which you borrow ideas and that you clearly distinguish them from your contributions.

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific h/w and lab assignments and materials will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class. There will be additional readings related to certain course topics.

#means required reading. *means optional reading.

Date	Topic/Reading	Assignment
	Module #0: Introduction	
Jan 23	Course Introduction	
Jan 25	Git • Pro Git:# ch1, ch2 • Pro Git:* ch3, ch6 • Atlassian Git Tutorial*	hw01 due Jan.30
	Module #1: Shell/Bash	
Jan 30	Shell Basics • The Linux Command Line:# ch1–ch5	•
Feb 01	Using the Shell • The Linux Command Line:# ch6–ch10 • The Linux Command Line:# ch11	hw02 due Feb.5
Feb 06	Scripting the Shell • Shell Scripting Tutorial# • The Linux Command Line:* ch24–ch36 • Ryans Bash Scripting Tutorial*	•
Feb 08	Filtering Text • The Linux Command Line:# ch19, ch20 • RegexOne#	hw03 due Feb.11
Feb 13	Exam #1	
	Module #2: C Programming	
Feb 15	Basics: Types, Operations, Control Structures. Complex Data Types: Strings, Arrays, Pointers, etc. Functions	•

Date	Topic/Reading	Assignment
	• Essential C:# sec1–sec4, sec6 (up to "Heap Memory") • System Programming Wikibook:# "C Programming, Part 4: Strings and Structs" • Beej's Guide to C Programming:# sec3, sec5, sec7–sec10	
Feb 20	Basics (cont.)	
Feb 22	Multi-File Programs, GCC & Make • Essential C:# sec5 • GCC and Make Tutorial#	hw04 due Feb.27
Feb 27	Debugging • Tutorial of gcc and gdb# • System Programming Wikibook:# "C Programming, Part 5: Debugging" • Beej's Quick Guide to GDB#	•
Mar 01	Memory, Valgrind • Essential C:# sec6 (from "Heap Memory") • System Programming Wikibook:# "Memory, Part 1: Heap Memory Introduction" (Valgrind) • Beej's Guide to C Programming:# sec11	hw05 due Mar.4
Mar 06	Exam #2	
Module #3: POSIX/Linux Programming		
Mar 08	System Calls • System Calls Make the World Go Round# • The Definitive Guide to Linux System Calls*	•
Mar 13	Spring Break	
Mar 15	Spring Break	
Mar 20	Review of advanced data structures in C (hash tables, binary search trees, etc.)	
Mar 22	Files, I/O • Beej's Guide to C Programming:# sec13 • System Programming Wikibook:* "9. File Systems"	•

Date	Topic/Reading	Assignment
Mar 27	Files, I/O (cont.) • The Linux Programming Interface:# ch4	•
Mar 29	Processes & IPC • Beej's Guide to Unix IPC:# sec1–sec4 • System Programming Wikibook:* "2. Processes" • System Programming Wikibook:* "4. Intro to Pthreads" • System Programming Wikibook:* "10. Signals"	•
Apr 03	Processes & IPC (cont.)	
Apr 05	Processes & IPC (cont.)	hw06 due Apr.5
Apr 10	Class canceled	
Apr 12	Networking • Beej's Guide to Network Programming:# sec2–sec6 • System Programming Wikibook:* "8. Networking"	hw07 due Apr.13
Apr 17	Networking (cont.)	
Apr 19	Exam #3	
Module #4: Some Fundamental System Programs		
Apr 24	Compilers • Modern Compiler Design:# ch1 (up to 1.7)	•
Apr 26	Assemblers • Modern Compiler Design:# ch8 (up to 8.4)	•
May 01	Linkers & Loaders • Beginner's Guide to Linkers#	•
Module #5: Misc./Advanced Topics		
May 03	Rust • The Rust Programming Language:# ch1–ch2	hw08 due May 7
May 08	Review	
May 10	Reading Day	
May 11	Final Exam (10:30am-12:30pm in same classroom)	

University at Albany / Computer Science
CSI 403 Algorithms & Data Structures

Spring 2018, Monday 5:45pm – 8:35pm, room ES-242
Lecturer: Andy Gallo, agallo@albany.edu
Hours: After lecture & by appointment

Text: Cormen, Leiserson, Rivest, Stein "Introduction to Algorithms", 3rd edition, MIT Press.

- We suggest reading the specified chapters from the text in advance of each lecture

Prerequisites: CSI 210 (Discrete Math) & 213 (Data Structures, formerly 310)

Objectives: Gain a broad appreciation for the logic and complexity of common algorithms and data structures, from abstract and concrete perspectives, via instructor-led and self-directed learning.

- Be able to compare and contrast the properties of common data structures
- Be able to perform analyses of complexity on common algorithms
- Be able to independently understand new algorithms and apply them to novel problems
- Be able to implement performant computer programs to realize studied algorithms

Course Website: Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and strongly encouraged.

Assessments & Grading:

• Homework	30%	5 @ 6% each
• Programming Projects	30%	5 @ 6% each
• Midterm Exam	20%	open book
• Final Exam	20%	open book

"Open book" is defined as any written material – textbooks, printouts, handwritten notes.
No digital devices are permitted during exams.

Homework: Homework assignments will be posted on the Blackboard. Solutions must be submitted to the Blackboard by the due date.

Programing Project Grading:
Programming projects to implement studied algorithms are posted on the Blackboard. Solutions may be implemented in any language but must be deployed in the form of a REST service. Any Web hosting platform may be used. Additional documentation on several suitable options will be provided.

- 60% credit awarded for a working service
  - service endpoint URL must be accessible at time of grading or no credit given
  - partial credit awarded based on the number of grading test cases which pass
- 40% for source code (complete & well formatted – code comments, etc.)

Late Policy:

- Submit homework & programming to the Blackboard by 11:59pm on the due date for credit
- **3-day grace period applies to programming projects only** – homework assignments are due on the due date - there is no grace period for homework assignments
- Programming projects will be graded -10% one day late, -20% two days late, -30% three days late (by 11:59pm on the 3rd day) - after three days programming work will not be accepted and a zero grade will be given

Grading Scale: the following is the natural grading scale – no curve is guaranteed

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Schedule: with chapters from text

Date	In Class, Lecture #	Work Due
Mon Jan 29	#1: Overview of class format, projects, Intro to algorithms (Ch. 1, 2)	
Mon Feb 5	#2: Analysis of algorithms (Ch. 2, 3, 4, A)	
Thurs Feb 8		Project 1
Sun Feb 11		Homework 1
Mon Feb 12	#3: Data structures (Ch. 10)	
Mon Feb 19	#4: Heaps & priority queues (Ch. 6)	
Sun Feb 25		Homework 2
Mon Feb 26	#5: Quicksort (Ch. 7)	
Thurs March 1		Project 2
Mon March 5	#7: Hash tables (Ch. 11)	
Sun March 11		Homework 3
Mon March 12	*** NO CLASS ***	
Mon March 19	#6: Other sorting techniques (Ch. 8, 9), review	
Mon March 26	**Midterm Exam**	Exam
Thurs March 29		Project 3
Mon April 2	*** NO CLASS ***	
Mon April 9	#9: Computational Geometry (Ch. 28, 33, D)	
Thurs April 12		Project 4
Mon April 16	#8: Binary Trees (Ch. 12)	
Sun April 22		Homework 4
Mon April 23	#10: Sets (Ch. 21, B)	
Mon April 30	#11: Graphs (Ch. 22, 23, 24, 25)	
Thurs May 3		Project 5
Sun May 6		Homework 5

Mon May 7	#12: Graphs (Ch. 22, 23, 24, 25), review	
Mon May 14	**Final Exam**	Exam

Policies:

Incompletes & Final Grading:
Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance / Lateness / Use of Computers in Class:
Students are expected to arrive to class on time. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Computers may be used during class for note taking as long as the use is not disruptive or distracting.

Responsible Computing:
Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

Students With Disabilities:
Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Director of the Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage http://www.albany.edu/disability/faculty-staff.shtml.

Medical Excuses:
See the University policy here: http://www.albany.edu/health_center/medicalexcuse.shtml.

Academic Honesty and Overall Regulations:
Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything

less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree. Plagiarism and other acts of academic dishonesty will be punished. Read the Standards of Academic Integrity and policies in the Undergraduate Bulletin (http://www.albany.edu/undergraduate_bulletin/regulations.html).

University at Albany / Computer Science

ICSI 426/526 Cryptography

Spring 2018

Meeting Time: T,Th 1:15-2:35 p.m.

Location: LC05

Instructor	Pradeep K. Atrey
Instructor title	Associate Professor
Office location	UAB 421
Office hours	T, Th 3:00-5:00 p.m.
Email address	patrey@albany.edu
Web page	http://www.cs.albany.edu/~patrey/
Teaching Assistants / Peer Educators /Graders	1) Shashank Arora (sarora3@albany.edu), Office hours: Monday, 4:00-6:00 p.m. 2) TBA 3) TBA

COURSE DESCRIPTION / OVERVIEW

The making of ciphers to encode information is the subject of cryptography. This course covers the field from its origins in early historic times through its most up-to-date implementations and uses in digital computers. Various ciphers will be shown and their security assessed. The latter is known as cryptoanalysis - the attempt to break cipher in order to read the underlying message. The course will emphasize how cryptography and cryptoanalysis are intimately related, and how the arms race between the two has motivated progress throughout their history.

PREREQUISITES/COREQUISITES

Please refer to the undergraduate and graduate course bulletin on the department website. Students are required to have a strong programming skill.

LEARNING OBJECTIVES/OUTCOMES

After successfully completing this course, students will be able to:

- understand the cryptographic methods and protocols
- analyze their security, and
- apply them in various real life applications such as encrypted domain data processing and image hiding.

REFERENCE BOOK(S)/READING LIST

R.1: Cryptography and Network Security: Principles and Practice, 6/E William Stallings
R.2: Cryptography: Theory and Practice, Third Edition Douglas R. Stinson
R.3: Introduction to Cryptography with Coding Theory, 2/E

Besides the information contained in these books, the appropriate material and examples will also be taken from other sources. Students are responsible for all material covered in the class.

TENTATIVE LIST OF TOPICS

Introduction to security concepts
Classical cryptography
Modern block ciphers (DES) and modes of operation, AES
Basic concepts in number theory and finite fields
Public key cryptography 1 (RSA)
Public key cryptography 2 (D-H key exchange algorithm, El Gamal's cryptosystem, Elliptic Curve cryptography)
Public key cryptography 3 (Message authentication, hash functions and digital signature schemes)
Shamir's secret sharing (SSS)
SSS and homomorphism 1
SSS and homomorphism 2 (application of SSS to large-scale cloud-based multimedia data processing)
Pseudorandom number generation and stream ciphers
Multimedia security
Additional topics (TBD)

COURSE WEBSITE AND BLACKBOARD

Blackboard will be used to provide essential course materials, the most current syllabus, and assignment documents and no separate course website will be maintained. However, this is not an online course and class attendance and participation is essential and required.

ASSESSMENT AND POLICIES

The accomplishment of course objectives will be assessed by applying the cryptographic methods and protocols in a combination of team and individual assignments/labs/projects, tests, and a final project that includes research and design, a written component, and an oral presentation.

Grading

For CSI526 students

- *Two* term tests (25%)
- Best *three* out of *four* homework (27%)

- Class participation/attendance or bonus homework (3%)
- Project (20%)
- Final exam (25%)

For CSI426 students

- *Two* term tests (25%)
- Best *three* out of *four* homework (27%)
- Class participation/attendance or bonus homework (3%)
- Term Paper (10%)
- Final exam (35%)

Grading Scale: the following is the natural grading scale – no curve is guaranteed

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Homework

Four homework will be given for hands on practice of various cryptographic techniques. The requirements for each homework will be fully described on Blackboard later in the course.

Term Paper (for CSI426 only)

In the term paper, students will be required to write a short article on a recent topic related to cryptography.

Project (for CSI526 students only)

The project can be taken individually or in a group of maximum two students. In case of a group project, participants must explicitly state their separate efforts/contributions. The marking scheme for group projects will be as follows: Joint efforts (40%) & individual efforts (60% each).

The project work includes implementation of a research paper related to Cryptography. Students need to search for recent papers related to theory and practical applications of cryptography techniques to pick one (or few) papers which will be understood, analyzed, implemented (and hopefully improved). Students' own novel improvement/extension will be necessary for obtaining the highest grade. The end result of this project is a proper, working prototype of the idea in the paper(s), and a written report. It is expected that the output is a graduate level technical project. The requirements for project will be fully described on Blackboard later in the course.

Term tests

There will be two term tests, which will be equally weighted. The tests will be held during class hours and date and time will be announced later. A portion of the class period preceding each test may be utilized for a review session.

Final exam

Final exam: May 17, 2018, 1:00-3:00 p.m. in LC05

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above grading crierita and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

ATTENDANCE/LATENESS/USE OF COMPUTERS IN CLASS

Students are expected to attend every class and to arrive on time. Please DO NOT disrupt the class by entering late or leaving early without instructor approval. Attendance will be taken at every class meeting. Each unexcused absence (one approved by either instructor prior to class) will result in a 1-point deduction from your class participation grade (if there is any). Computers may be used during class for note taking as long as the use is not disruptive or distracting. Also see http://www.albany.edu/health_center/medicalexcuse.shtml.

RESPONSIBLE COMPUTING

Students are required to read the University at Albany Policy for the Responsible Use of Information Technology (http://www.albany.edu/its/policies_responsible_use_of_IT.htm). Students will be expected to apply the policies discussed in this document to all computing and electronic communications in the course.

STUDENTS WITH DISABILITIES

Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Director of the Disability Resource Center (Campus Center 137, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage http://www.albany.edu/disability/faculty-staff.shtml.

ACADEMIC HONESTY AND OVERALL REGULATIONS

Every student has the responsibility to become familiar with the standards of academic integrity at the University. Faculty members must specify in their syllabi information about academic integrity, and may refer students to this policy for more information. Nonetheless, student claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity. Students are responsible for familiarizing themselves with the standards and behaving accordingly, and UAlbany faculty are responsible for teaching, modeling and upholding them. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree. Plagiarism and other acts of academic dishonesty will be punished. Read the Standards of Academic Integrity and policies in the Undergraduate Bulletin (http://www.albany.edu/undergraduate_bulletin/regulations.html) and in the Graduate Bulletin (http://www.albany.edu/graduatebulletin/requirements_degree.htm).

CAUTION AND A STRONG WORD OF WARNING!!!! Plagiarism and other acts of academic dishonesty will be punished. Students are expected to submit original work. While you may discuss a problem with another student, the work you submit must be your own. Any student who submits copied work or any student that provides work for copying will earn a zero grade for that assignment. If there is more than one copying incident, the student will be graded an E for the class. As per college policy, cheating activity, including cheating in exams, quizzes, projects, etc, WILL be written up in a Violation of Academic Integrity Report (VAIR) reported to the college administration, which includes the Computer Science Chair, the College of Engineering and Applied Sciences Dean, and the Vice Provost of Undergraduate Studies. This will become a part of your permanent record. Multiple incidents will result in being expelled from the college.

Good luck!

University at Albany / Computer Science
CSI-435 Introduction to Artificial Intelligence
Fall 2017 Syllabus

Meeting Time: Fr 9:20am – 12:10pm
Location: BB B010
Class Dates: Aug 28, 2017 – Dec 11, 2017
Credits: 3

Instructor	Ming-Ching Chang
Instructor Title	Assistant Professor
Office Location	BA-314
Office hours	W 10:15-11:35am
E-mail Address	mchang2@albany.edu
TA's / Peer Educators	TBD

Textbooks: GitBook – Artificial Intelligence written by Leonardo Araujo dos Santos
https://www.gitbook.com/book/leonardoaraujosantos/artificial-inteligence/details

COURSE DESCRIPTION / OVERVIEW

An introduction to the broad spectrum of approaches and techniques of Artificial Intelligence. Emphasis on how to represent knowledge in a computer and how to process that knowledge to produce intelligent behavior. Topics include expert systems, heuristic search, natural language processing and logic-based approaches. Programming assignments using artificial intelligence languages.

In this course, students will learn modern artificial intelligence – from the classic artificial intelligence topics and basic machine learning to the latest topics of deep learning and visual intelligence. This course is designed to be hands-on and project oriented. Students will be learning the *theory* from lectures and reading research papers, as well as learning the implementation / applications via hands-on programming projects. Picking a research project during the learning in this course, and implementing this project and perform a final presentation of the course project continuous toward the end of this course is the most crucial accomplishment and requisite of this course.

Detailed topics include:

- Introduction to classic artificial intelligence
- Fundamentals on visual intelligence (image processing and computer vision)
- Introduction to machine learning
- Introduction to deep neural networks and deep learning
- Introduction to mainstream deep learning software packages – Tensorflow, Caffe, etc.
- Convolutional neural network (CNN)
- Recurrent neural network (RNN), LSTM

- Generative adversarial networks (GAN) and unsupervised deep learning
- Deep reinforcement learning

This course will also include a final hands-on project working with modern deep learning or visual intelligence topics.

PREREQUISITES

CSI-310 Data Structures

LEARNING OBJECTIVES / OUTCOMES:
The main objective of this course is to help students understand the fundamentals of modern artificial intelligence – from the essence of classic artificial intelligence and machine learning to the recent and ongoing breakthroughs of deep learning and deep neural networks. At the completion of the course the student will be able to:

- Explain how classical artificial intelligence has evolved into the modern breakthroughs
- Explain the difference between machine learning and deep learning
- Explain why visual intelligence is the essence and core of modern artificial intelligence
- Understand basic image processing
- Understand basic computer vision
- Understand basic machine learning
- Understand the basics of deep neural networks, and popular neural work models (CNN, RNN, GAN)
- Understand the basics of how to train a neural network, be able to explain what is back-propagation, loss function, and stochastic gradient descent
- Design and implement a deep neural work via a hands-on course project
- Understand the applications and impact of the modern artificial intelligence, how it has changed our daily life, and how it will continue to impact us
- Conduct research via paper reading and the course project
- Complete a hands-on course project on a selected topic on modern artificial intelligence and related applications.

COURSE WEBSITE AND BLACKBOARD:
Blackboard will be used to provide essential course materials, the latest syllabus, and assignment documents. No separate course website will be maintained. Active class participation is essential for final grading as a requirement.

ASSESSMENT AND POLICIES:
The accomplishment of course objectives will be assessed by the ability to apply the learned concepts and tools in a combination of assignments, tests, and the final project.

Homework Assignments: Homework assignments might be due as the course progress.

Exams: One exam will be given after the mid-term period and prior to the final exam period. Final course project presentation will be held in place of a final exam.

Course Projects: Projects will be assigned and will be graded based on three scheduled presentations – initial project presentation, mid project presentation, and final project presentations. Students will work a selected project independently, or a larger project jointly in a team. Project topic selection will be guided and approved by the instructor. Student will learn hands-on practical skills by working diligently and focusing on the selected project.

Grading

A final grade will be determined as a weighted average of these scores using the following weights:

Participation 20%
Exam 20%
Initial Project Presentation 15%
Mid Project Presentation 20%
Final Project Presentation 25%
Total possible points = 100

Grading Scale

A+: 95-100 points
A: 90-94 points
A-: 85-89 points
B+: 80-84
points B:
75-79
points
B-: 70-74 points
C+: 65-69 points
C: 60-64 points
C-: 55-59 points
D: 50-54 points
E: 49< points and below, FAILED

Students must complete all requirements in order to pass the course. A grade of incomplete will be given only when circumstances beyond the student's control cause a substantial amount of course work to be unfinished by the end of the semester. Whenever possible, the student is expected to make extra efforts to prevent this situation from occurring. The instructor will be the sole judge of whether an incomplete is warranted. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned."

Attendance

Attendance and participation will be measured by student involvement and engagement as outlined in assignments and course activities.

Responsible Computing

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Title IX

The University at Albany recognizes that an in order to maintain a healthy, safe, and vibrant living and learning community, it must continue to foster an environment free from gender inequality and sexual violence. In furthering its commitment to that cause, the University has appointed a full time administrator to ensure our realization of this important agenda. Further information can be found at the following U Albany url: http://www.albany.edu/titleIX/indexmain.php

Timely Assessment

Patterns of testing, assignments, and examinations vary widely across departments and courses. It is important, however, that students in all courses be provided with assessment of their progress in a timely way. Students will receive some formal assessment of their progress well before the last date to withdraw from a course.

Student Code of Conduct

Student and staff/faculty interactions in the class room and other on-campus environments are expected to be professional and cordial. Disruptive behavior in the class room may be treated by the instructor as a violation of the U Albany Student Code of Conduct, and subject to a formal Student Conduct Referral.

COURSE OUTLINE AND READINGS:

The following schedule of lecture topics and reading assignments is preliminary and may be changed as the semester progresses. The final schedule and specific assignments will be provided in Blackboard. Students are expected to have read the listed material before it is covered in class.

Weeks	Date	Topic	Readings	Notes
1	9/1	Course Introduction	1.1, 1.2	
		Syllabus, course video		
2	9/8	**Course Overview**		
		Programming hands on (Python, C++)		
		course project introduction		
3	9/15	**Fundamentals on visual intelligence**		
		Image processing: pixels, filters	PyCV book ch1	
		computer vision	PyCV book ch2	
4	9/22	No class (Rosh Hashanah)		
5	9/29	**Machine Learning intro**		
		Kevin Murphy ML intro		reading/discussion
		feature representation, SVM, DPM		
6	10/6	**Deep Network intro**		
		Yann LeCun slides		reading/discussion
		LeNet, from ML to DL		paper reading/discussion

7	10/13	Init project presentation		**Init Presentation (15%)**
		Deep learning packages		reading/discussion
		Tensorflow, Caffe, ...		reading/discussion
8	10/20	**CNN**		paper reading/discussion
		back-propagation		reading/discussion
		loss function, SGD		reading/discussion
9	10/27	**RNN**		paper reading/discussion
		LSTM		paper reading/discussion
10	11/3	**GAN**		paper reading/discussion
		GAN vs W-GAN		paper reading/discussion
		image style transfer		paper reading/discussion
11	11/10	Mid project presentation		**Mid Presentation (20%)**
		Review for exam		
12	11/17	**Exam**		**Exam (20%)**
13	11/24	No class (Thanksgiving)		
14	12/1	**Reinforcement Learning**	RL intro ch.1	paper reading/discussion
		Course summary		
15	12/8	Final Presentation (I)		
16	12/15	Final Presentation (II)		**Final Slides Due (25%)**

University at Albany / Computer Science

Machine Learning

CSI 436/536

Spring 2018

Meeting time: TH 4:15-7:05PM

Location: CH151

instructor Information

Instructor: Dr. Siwei Lyu (Associate Professor of Computer Science)
Office Location**: UAB 414**
Office Hours: MWF12:00a-1:00p or by appointment
Teaching Assistant: Shengkun Li (Office 412D)
Office Hours: Tuesday 10:00a - 12:00p
Email: sli29@albany.edu

Textbooks: We do not use a textbook, all should be based on the lecture slides of the instructor

Course Description

Content: Machine learning is an important and rapid growing branch of artificial intelligence. The aim of machine learning is to design algorithms that can extract information from environment automatically and improve their ability to perform the intended task. This course starts with a high level overview of general problems in machine learning, followed by a review of mathematical backgrounds and numerical optimization methods that are essential for machine learning algorithms, after that several important topics in machine learning will be covered, including

- dimension reduction methods:
  - principal component analysis, multi-dimensional scaling and ISO-MAP
- classification methods:
  - ROC and AUC, types of loss functions
  - linear discriminant analysis, k-nearest neighbor classifier, and logistic regression
- regression methods:
  - least squares regression, ridge regression, and l1 regularized least squares regression (LASSO)
- clustering methods:
  - k-means clustering and EM algorithm
- support vector machines for classification and regression
- deep learning: artificial neural networks and other hierarchical models

Learning Outcomes: At the completion of the course the student will:

- understand key concepts and algorithms in machine learning;

- develop a fundamental understanding of machine learning algorithms and tools;
- be able to apply such algorithms to practical applications.

Prerequisite: the prerequisite to this class is very important, and lack of knowledge of these subjects will make difficult to make positive progress in the class. There will be an entrance exam to test the readiness of this class.

- Linear Algebra (AMAT 220 or equivalent)
- Multivariate calculus (AMAT 214 or equivalent)
- Discrete probability (AMAT 367 or equivalent)
- Numerical methods (CSI 401 or equivalent).

Grading and Evaluation

There will be an individual set of grades and a team set of grades. You final course grade with be composed of the following elements:

30%	in class quizzes
30%	homework assignments
20%	midterm exam
20%	final project/exam

Grading Scale

A: 100-95 points A-: 94-90 points
B+: 89-87 points B: 84-86 points B-: 80-83 points
C+: 79-76 points C: 75-70 points
D: 69-60 points
E: 59 points and below

Students must complete all requirements in order to pass the course. Final grades are computed based on the above formulas and are NOT negotiable. Per department policy, "*…students may not submit additional work or be re-examined for the purpose of improving their grades once the course has been completed and final grades assigned*."

Policies

Attendance: Your in-class performance is key to your success in this course and graded in-class quizzes constitute an important part of the course grade. Attendance is checked every class, although it is not part of the final grade, consistently missing classes will cause degraded performance of your final grade: one "no show" without legitimate explanation that is caused by uncontrollable or unavoidable reasons in class will lead to a 30% reduction of total final grades; twice and more will lead to an F grade to the class. If you know that it will be difficult for you to consistently get to class on time and stay for the entire period, you should take this course at a time that better fits your schedule.

Late Turn-ins: homework turned in before or on the specified due date and time, in class or submitted through Blackboard, depending on the circumstance, are eligible for 100% of the grade. If you choose to turn in after the due date and time passes, for the first 24 hour period after the due date and time, your assignment will be eligible for 50% of the full grade; after that, your assignment will be eligible for 0% of the full grade.

Withdrawal without Penalty: Please pay attention to the drop date, which is the last date you can drop this course with no financial consequence. After that, you should consult the university's liability schedule (http://www.albany.edu/studentaccounts/liability.php) to consider dropping from this class. This may happen when you have to miss many assignments for unforeseeable scenarios. IMPORTANT: It is your responsibility to take such an action by this date, and don't wait until it's too late to see us when you get in trouble.

Incomplete and Extra Credit Policy: As per the Undergraduate Bulletin, the grade of Incomplete (I) will be given "only when the student has nearly completed the course requirements but because of circumstances beyond the student's control the work is not completed." A student granted an incomplete will make an agreement specifying what material must be made up, and a date for its completion. The incomplete will be converted to a normal grade on the agreed upon completion date based upon whatever material is submitted by that time. The instructor will be the sole judge of whether an incomplete is warranted. IMPORTANT: Incomplete will not be given to students who have not fulfilled their classwork obligations, and who, at the end of the semester, are looking to avoid failing the course. There will be no extra credit work. All students will be expected to complete, and be graded on, the same set of assignments.

Academic Integrity: Every student has the responsibility to become familiar with the standards of academic integrity at the University. Anything less undermines the worth and value of our intellectual work, and the reputation and credibility of the University at Albany degree. Plagiarism and other acts of academic dishonesty will be reported to the department and university. Cheating in homework or exam will be promptly reported to the Department and subject to the disciplinary punishment from the Department.

Non-Class Related Use of Technology: Use of electronic devices (cell phone, tablets, personal laptop computers) for non-class purposes while the class is in session is not allowed. If this is violated in a consistent manner after initial warning is issued by the instructor, the student involved will be treated as unexcused missing the day's class.

Students with Disabilities: Reasonable accommodations will be provided for students with documented physical, sensory, systemic, medical, cognitive, learning and mental health (psychiatric) disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Disability Resource Center (518-442-5490; drc@albany.edu). Upon verification and after the registration process is complete, the DRC will provide you with a letter that informs the course instructor that you are a student with a disability registered with the DRC and list the recommended reasonable accommodations.

For further information refer to the University's Disclosure Statement regarding Reasonable Accommodation found at the bottom of the document at the following website: http://www.albany.edu/disability/docs/RAP.doc. This website can be reached by following the link under "Reasonable Accommodation Policy" at the following webpage http://www.albany.edu/disability/faculty-staff.shtml.