EEL 3211C – Basic Electric Energy Spring 2022 Flipped Classroom

Credits: 4

Meeting Times:	MWF 8'th period	(3:00 p.m. -3:50 p.m.)	NEB 101
	Class Section 11810 Lab Time M 11-E1	(6:15 p.m.- 8:10 p.m.)	NEB289
	Class Section 11811 Lab Time W 9-10	(6:15 p.m.- 8:10 p.m.)	NEB289
	Class Section 11826 Lab Time T E2-E3	(8:20 p.m.- 10:10 p.m.)	NEB289

Instructor:	Keith J. Rambo	534 NEB	rambo@ufl.edu	352-392-4243
	Office Hours:	M W F	1:30-2:30, or by appointment	
TA/Lab:	Brenden Mears NEB 289		mearsb@ufl.edu	Office Hours: Lab Times
NINJA	Abigail Bryant NEB 222		abigail.bryant@ufl.edu	Office Hours: TBD

General Description: Analysis and modeling of power system components. Magnetic circuits, energy conservation, transformers, AC and DC rotating machines, introduction to power transmission.

Objectives: Learn the basics magnetic circuits, transformers, motors, and generators. Design circuits and systems to meet desired needs. Engage in life-long learning. After successful completion of this course, the student will have a basic understanding of:

- MATLAB examples and Electromagnetic circuits and systems — Week 1-3
- Three phase circuits including wye and delta configurations — Week 3-4
- Transformer function, characteristics and uses — Week 5-7
- AC machinery — Week 8-9
- Synchronous Machinery, characteristics and uses — Week 9-11
- Induction Motors, characteristics and uses — Week 12-13
- DC Machinery, characteristics and uses — Week 14
- Transmission Lines, characteristics — Week 15

Required **Text:** Electric Machinery Fundamentals, by Stephen J. Chapman – 5th ed. ISBN 0073529540 e-Book
Recommended Text: Electric Machinery and Power System Fundamentals, by Stephen J. Chapman – 1st ed.
ISBN 978-00-712262-0

Calculator: A *TI N-Spire* or equivalent polar-rectangular mixed mode calculator will be *required*.
Internet Bandwidth Requirement: ***You must have 10 Mbps download bandwidth speed to take this course.***
This is to ensure that you can view video without buffering as defined by UF Mediasite bandwidth requirements. Measurements of bandwidth should be tested at http://speedtest.net to verify availability of bandwidth (home or campus). Campus Wireless Access Points (WAP) generally (based on number of users on a single WAP) have sufficient bandwidth to accommodate this requirement.

Zoom Simulcast with recording: All classes with be live in their respective classrooms and Zoom simulcast with the Zoom recording available shortly after class. Synchronous attendance of the class is required. Breakout spaces will be used during class and computers are required during class time.

Grading: Class attendance *for the entire period* and *participation* is required. There will be *three* tests, a final, Laboratory, in/out of class *homework* and *daily quizzes via PollEverywhere* (for required video viewing and class *attendance verification (no credit provided for partial period attendance/participation)*.) *Homework* turned in *late will not be given credit* as solutions will be reviewed and video posted following the homework due date.

For the daily quizzes, you must log in with your gatorlink id and must have watched 90% or more (as measured by Mediasite analytics) of each of the videos that are required for that class period as shown on the website eadmin.ece.ufl.edu. Failure to meet this requirement will result in a zero score for the material on that quiz. A quiz grade credit of (+0.25) will be given for attending and putting your name on the quiz if you have not watched the material as the quiz is for two purposes: Attendance and Comprehension. Each class period will have one quiz associated with that period unless otherwise notified on Canvas.

Quiz/Test/Exam: One 3" X 5" card will be allowed to assist, as well as calculator. No other electronics are allowed. A ruler will be allowed and will be helpful in interpreting graphs. Formula sheet will be provided with formulas from Chapman on Tests/Exam. Each quiz also contains bonus point(s) that are mostly based on architecture of the UF campus. You will see me standing in front of, places on campus, which you should be able to identify as a member of the Gator Nation (hint: check out…. http://web.uflib.ufl.edu/ufarch/historic.htm and http://web.uflib.ufl.edu/ufarch/gallery.htm).

The tests (1-3) will be given in evenings as part of a combined help session/test starting at 7:00 PM.

Test	Date	Tentative Chapters
1	02/07/22 (Wednesday)	1-2
2	03/03/22 (Thursday)	3-4
3	04/07/22 (Thursday)	5,7
Final	04/28/22 7:30 a.m.-9:30 a.m.	1,2,3,4,5,7,8,9
Homework	In Class	

An overall **test score**, **T**, between 0 and 100, will be calculated for each student as shown below.

$$T = \frac{0.13T_1 + 0.13T_2 + 0.13T_3 + 0.26F}{0.65}$$

Where T_1, T_2, T_3 and ***F(Final)*** are each of the three tests and final weighted as shown above.

The laboratory will be worth up to 20% of the final grade. If the semester lab grade (**L**) falls below a C+ (77.5%) then the lab grade (**L**) will be weighted as: $L = (\text{Final Lab Grade}) \times 0.50$ and that value will be applied in the formula below.

The score, **S**, for the course will be calculated as follows assuming that **HW** represents the overall homework score.

Then:

$$S = 103\% = 3\%(\text{Daily Quizes}) + 15\%\ \text{HW} + 65\%\ \text{T} + 20\%\ \text{L}\ .$$

****** WARNING: Canvas Posted Scores (S) ***Do Not Reflect*** the Actual Score (S). ********

Grades will be assigned based on the table shown below.

Overall Score **(S)**	Grade
92.5-100	A
90-92.499…	A-
87.5-89.99…	B+
82.5-87.499…	B
80-82.499…	B-
77.5-79.999…	C+
72.5-77.499…	C
70-72. 499..	C-
67.5-69.99…	D+
62.5-67.499…	D
60-62.499…	D-
Less than 60	E

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by

a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

Covid-19 Protocols:

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another

and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.

Relation to Program Outcomes (ABET):

Outcome	**Coverage***
An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
An ability to communicate effectively with a range of audiences	
An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Topic

UF ECE EEL 3211C MMXXII
ECE Department of Electrical & Computer Engineering
EEL 3211C List View
EEL3211C JAN 05 #01 (60') JAN 07 #02 (53') JAN 10 #03 (39') JAN 12 #04 (33') JAN 14 #05 (50')
JAN 19 #06 (38') JAN 21 #07 (61') JAN 24 #08 (58') JAN 26 #09 (45') JAN 28 #10 (40') JAN 31 #11 (58')
FEB 02 #12 (62') FEB 04 #13 (67') FEB 07 #14 (54') T#1 FEB 09 #15 (51') FEB 11 #16 (54') FEB 14 #17 (53')
FEB 16 #18 (41') FEB 18 #19 (55') FEB 21 #20 (50') FEB 23 # 21 (50') FEB 25 #22 (61') FEB 28 #23 (71')
MAR 02 #24 (47')T#2 MAR 14 #25 (45') MAR 16 #26 (50') MAR 18 #27 (50') MAR 21 #28 (35') MAR 23 #29 (44')
MAR 25 #30 DT (43') MAR 28 #31 (37') MAR 30 #32 (46') APR 01 #34 (42') APR 04 #36 (62') APR 06 #35 (XX') T#3
APR 08 #36 (XX') APR 09 DEERHAVEN APR 11 #37 (47') APR 13 #38 (54') APR 15 #39 (56') APR 18 #40 CH (90')
APR 20 #41 (55') EEL3211C LIST VIEW
#1 EEL 3211C Flipped Classroom Methods (15').mp4
#2 EEL 3211C Materials Expectations and Grading Policy (25').m4v
#2a Excerpt from : Uranium – Twisting the Dragon's Tail Part Two 11'
#2b Creating an Asian Power Grid (9')
#3 EEL 3211C Lynda and Matlab (14').mp4
#4 EEL 3211C Chapman Matlab Files and Examples (5').mp4
#5 EEL 3211 Matlab Examples (1 of 3) (12').mp4
#6 EEL 3211 Matlab Examples (2 of 3) (14').mp4
#7 EEL 3211C Matlab Examples (3 of 3) (8').mp4
#8 EEL 3211C Force Torque Work and Power (19').mp4
#9 EEL 3211C Electromagnetism and Power (20').mp4
#10 EEL 3211C Magnetic Cores B,H,Mu,F,N,I,Phi and R (20').mp4
#11 EEL 3211C Magnetic Circuit Examples (1 of 2) (13').mp4
#12 EEL 3211C Magnetic Circuit Examples (2 of 2) (27').mp4
#13 EEL 3211C Torque Examples (23').mp4
#14 EEL 3211C Magnetic Circuit Example Cylinder in Core (23').mp4
#15 EEL 3211C More Magnetic Circuit Examples (9').mp4
#15a EEL 3211C Math Relationships of Core Parameters (6').mp4
#16 EEL 3211C Domains, Hysteresis, Lenz's Law (33').mp4
#17 EEL 3211C Force on a Wire (EMF) (29').mp4
#18 EEL 3211C Complex Power, Circuit Elements (24').mp4
#19 EEL 3211C Leading and Lagging Complex Elements (18').mp4
#20 EEL 3211C 3 Phase Power Introduction (16').mp4
#21 EEL 3211C 3 Phase Wye and Delta Line and Phase Characteristics (26').mp4
#22 EEL 3211C 3 Phase Wye Source and Load Example (19').mp4
#23 EEL 3211C 3 Phase Wye and Delta Examples (40').mp4
#24 EEL 3211C Force on Wire and Delta to Wye Conversion (28').mp4
#24a EEL 3211C Precision of Calculations & Delta to Wye Conversion (9').m4v
#24b EEL 3211C Delta Wye Review Part 1 of 2 (5') .m4v
#24c EEL 3211C Delta Wye Review Part 2 of 2 (3') .m4v
Up and Running with MATLAB 90'
Hoover Dam 34'
Construction of The Hoover Dam.pdf
Creating an Asian Power Grid (9').m4v
Uranium – Twisting the Dragon's Tail Part One
Uranium – Twisting the Dragon's Tail Part Two
Search for the Super Battery
Ex_Files_UaR_MATLAB.zip
p32.mag
Spring 2022 HW #1 Review
Spring 2022 HW #2 Review
Spring 2022 HW #3 Review
Spring 2022 HW #4 Review
Spring 2022 HW #5 Review
Spring 2022 HW #6 Review
Spring 2022 HW #7 Review
Spring 2022 HW #8 Review
Spring 2022 HW #9 part 1 Review
Spring 2022 HW #9 part 2 Review
Spring 2022 HW #10 Review

Topic

#25 EEL 3211C What is a Transformer (TX) (22').mp4
#26 EEL 3211C Transformer (TX) Conventions and Impedance Relationships (10').mp4
#27 EEL 3211C TX Relationships of Flux, E(ind) and Power (21').mp4
#29 EEL 3211C A Real TX and a Fun Faults Video(10').mp4
#30 EEL 3211C Flux Characteristics and Loss Elements in TX (13').mp4
#31 EEL 3211C TX Loss Elements Continued (23').mp4
#32 EEL 3211C TX Example Problem using Loss Elements (28').mp4
#33 EEL 3211C Vector Analysis Review (17').mp4
#34 EEL 3211C The Per-Unit (PU) Method (37').mp4
#34A EEL 3211C Additional Per Unit Analysis Information (38').mp4
#34B EEL 3211C Per-Unit Method Example (15').mp4
#35 EEL 3211C TX Loss Element Analysis Method (22').mp4
#36 EEL 3211C Problems using TX Loss Elements (19').mp4
#37 EEL 3211C 3 Phase Transformers (18').mp4
#38 EEL 3211C 3 Phase Transformer Problems (22').mp4
#39 EEL 3211C Transformer Ratings and Issues (15').mp4
#40 EEL 3211C Rotating Machinery Introduction (1 of 4) (30').mp4
#40a EEL 3211C Rotating Machinery Introduction (Turner) (1 of 4) (50').mp4
#41 EEL 3211C Rotating Machinery Continued (Turner) (2 of 4) (27').mp4
#42 EEL 3211C Rotating Machinery Continued (Turner) (3 of 4) (9').mp4
#43 EEL 3211C Rotating Machinery Continued (Turner) (4 of 4) (14').mp4
#41a EEL 3211C Rotating Machinery Continued (2 of 4) (13').mp4
#42a EEL 3211C Rotating Machinery Continued (3 of 4) (8').mp4
#43a EEL 3211C Rotating Machinery Continued (4 of 4) (10').mp4
#44 EEL 3211C 3 Phase Machine DIrection of Rotation (13').mp4
#45 EEL 3211C Force and Torque on Wire Loops (11').mp4
#46 EEL 3211C Net Magnetic Filed (B-Net) (20').mp4
#47 EEL 3211C Synchronous Machine Forces, Torque, and Losses (27').mp4
#50 EEL 3211C Synchronous Machine Construction (21').mp4
#51 EEL 3211C Synchronous Generator Model and Vector Analysis (26').mp4
Modern Marvels Power Plants (45').mp4

Topic

#52 EEL 3211C Synchronous Generator Phasor Diagrams(15').mp4

#53 EEL 3211C Synchronous Generator Power and Torque (19').mp4

#54 EEL 3211C Synchronous Generator Model Parameter Determination (16').mp4

#55 EEL 3211C Synchronous Wye Connected Machine Example (Turner) (21').mp4

#56 EEL 3211C Synchronous Wye Connected Machine V Phi Analysis (Turner) (14').mp4

#57 EEL 3211C Synchronous Machine Power, Efficiency and Regulation (Turner) (15').mp4

#58 EEL 3211C Why do we Simplify the Machine Model? (Turner) (9').mp4

#59 EEL 3211C Synchronous Machine Motor Model Differences (Turner) (13').mp4

#60 EEL 3211C Synchronous Motor Phasor Diagrams (13').mp4

#61 EEL 3211C Synchronous Motor Delta Connected Example (17').mp4

#62 EEL 3211C Synchronous Generator Delta Connected Example (16').mp4

#63 EEL 3211C Synchronous Motor Use for Power Factor (PF) Correction (11').mp4

#64 EEL 3211C Starting Synchronous Motors (17').mp4

#65 EEL 3211C Amortisseur Winding, Service Factors, Phasor Summary (18').mp4

#66 EEL 3211C Magnetic Field Measurements on a Rotor (8').mp4

#67 EEL 3211C Introduction to Induction Motors (16').mp4

#68 EEL 3211C Rotor Slip on Induction Motors (13').mp4

#69 EEL 3211C Rotor Slip Example (8').mp4

#70 EEL 3211C Induction Motor Equivalent Circuit(13').mp4

#71 EEL 3211C Induction Motor Power Flow (8').mp4

#72 EEL 3211C Induction Motor Power and Torque (12').mp4

#73 EEL 3211C Induction Motor Power, Torque and Efficiency Example (13').mp4

#74 EEL 3211C Induction Motor Rotor Loss and Power Analysis (21').mp4

#75 EEL 3211C Induction Motor Thevenin Circuit Analysis (21').mp4

#77 EEL 3211C Induction Motor Power, Torque,Slip and Speed Example (19').mp4

#78 EEL 3211C Induction Motor Rotor R Effects and Model Determination (18').mp4

#79 EEL 3211C Induction Motor Model Parameter Calculation Example (25').mp4

#81 EEL 3211C DC Motors; E(ind) on Rotating Loop in Static B (28').mp4

#82 EEL 3211C DC Motors; Example Torque Voltage and Power (11').mp4

#83 EEL 3211C DC Motors; Commutation on a 4 Loop Machine (10').mp4

#85 EEL 3211C DC Motors; DIfficulties with Commutation (11').mp4

#86 EEL 3211C DC Machines; Design, Power Flow and Examples (13').mp4

#87 EEL 3211C DC Machines; Effect of Varying Rf (6').mp4

#84 EEL 3211C Chuck Hawkins Lecture (52').mp4

#88 EEL 3211C DC Machines; Effect of Varying R on Omega (5').mp4

#89 EEL 3211C DC Machines; Commutator Segment Connections (11').mp4

#90 EEL 3211C DC Machines; Additional Types (8').mp4

#91 EEL 3211C Introduction to Power Transmission Lines (20').mp4

#92 EEL 3211C Properties of Distribution Systems (17').mp4

#93 EEL 3211C Transmission Line Tables and Chapman 9.1 (19').mp4

LEGEND:

Matlab ***Magnetic Cores*** ***Transformers*** ***Rotating_Machines*** ***Synchronous_Machines***

EEL3211C - Electrical Energy Conversion Laboratory

Spring 2022

I. Catalog Description

Electric energy conversion, devices and systems.

II. Co-requisites

None

III. Course Objectives

The main purpose of this lab is to familiarize the student with the main areas of study of conventional electric energy conversion. This includes Power Measurement & Instrumentation, Transformers, DC Motors & Generators, Induction Machines, and Synchronous Machines.

IV. Lab TA: Brenden Mears

a. Phone:
b. Email: mearsb@ufl.edu

V. **Class Nija TA: NA**

VI. Meeting Location

NEB 289

VII. Grading

The course will be composed of the following:

- Lab Reports
- Participation and Prelab
- Quizzes

VIII. Grading Scale

Letter grades are based on the table below.

Overall Score	Grade
92.5-100	A
90-92.499…	A-
87.5-89.99…	B+
82.5-87.499…	B
80-82.499…	B-
77.5-79.999…	C+
72.5-77.499…	C
70-72. 499..	C-
67.5-69.99…	D+
62.5-67.499…	D
60-62.499…	D-
Less than 60	E

IX. Lab Policies & Expectations

a. Groups: Beginning with Lab 1, students will form groups of two, with each group getting a separate workstation.
b. Preparation: The student is expected to read and understand the laboratory procedure before starting the experiment, and to have answers for any questions contained in any assigned prelabs.
c. Safety: All safety requirements are outlined in the lab manual and must be followed at all times.
d. Reports: Lab Reports are due by the start of the next lab. Each member of every group is responsible for their own lab report. For more information on report structure and grading, refer to the lab manual.
e. Make-Up Labs: If a lab cannot be attended, send the TA an **email prior** to the lab to arrange a make-up.
f. Late Attendance: If a student is 10 minutes late to class, the student will not be allowed to perform the lab that day or turn in a lab report.
g. Late Lab Reports: Completed lab reports are due the following lab (Usually every two weeks). If a lab report is not turned in during the first 10 minutes of the following lab, there is a 25% penalty. If it is turned in 1 week after the due date there will be a 50% penalty.

X. Lab Schedule- TBD