

Syllabus: EEL 3211C – Basic Electric Energy Summer 2023

Flipped Classroom



Credits: 4

Meeting Times: MWF 6th period (3:30 p.m. - 4:35 p.m.)
Class Section 15540 Lab Time W E1-E2 (7:00 p.m. - 9:45 p.m.)
Class Section 15539 Lab Time T E1-E2 (7:00 p.m. - 9:45 p.m.)
Class Section 15541 Lab Time R E1-E2 (7:00 p.m. - 9:45 p.m.)

Instructor: Keith J. Rambo 534 NEB rambo@ufl.edu 352-392-4243
Office Hours: M W F 1:00-2:00, Zoom or by appointment

TA/Lab: David Blow david.blow@ufl.edu Office Hours: Lab Times

NINJA 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 1-2
- Three phase circuits including wye and delta configurations Week 3
- Transformer function, characteristics and uses Week 4-5
- AC machinery Week 6-7
- Synchronous Machinery, characteristics and uses Week 8-9
- Induction Motors, characteristics and uses Week 9-10
- DC Machinery, characteristics and uses Week 11-12
- Transmission Lines, characteristics Week 12

Course Pre-Requisites / Co-Requisites: [EEL 3008](#).

Materials and Supply Fees: \$78.48

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 89 Titanium or equivalent polar-rectangular mixed mode calculator will be *required*. TI N-Spire preferred.

Laptop or USB Camera: Required for Zoom

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.

Grading: Class attendance *for the entire period* and *participation* is required. There will be *three* tests, Laboratory, in/out of class *homework* and *daily quizzes via PollEverywhere*. *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) all of the module videos for that class day, prior to the beginning of that day's class period of each of the videos that are required 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	06/14/23 (Wednesday)	1-2-Appendix A
2	07/17/23 (Monday)	3-6
3	08/09/23 (Wednesday)	1-8, Transmission Lines

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

$$T = \frac{(0.175T_1 + 0.175T_2 + 0.25T_3)}{0.60}$$

Where T_1 , T_2 , T_3 and F 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.

$$S = 0.05 (\text{Daily Quizzes}) + 0.15HW + 0.60T + 0.20L$$

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

Grades will be assigned based on the table shown 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

Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/students/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

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 Honor Code (<https://www.dso.ufl.edu/%20sccr/process/student-conduct-honor-code>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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.

Students Requiring Accommodations: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UF Grading Policy: Details may be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

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

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 support, 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://www.crc.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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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

Absences: Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first class meeting. In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. Students cannot participate in classes unless they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors. If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and he or she has not contacted the department to indicate his or her intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory. The university recognizes the right of the individual professor to make attendance mandatory. After due warning, professors can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Religious Holidays: At the University of Florida, students and faculty work together to allow students the opportunity to observe the holy days of his or her faith. A student should inform the faculty member of the religious observances of his or her faith that will conflict with class attendance, with tests or examinations, or with other class activities prior to the class or occurrence of that test or activity. The faculty member is then obligated to accommodate that particular student's religious observances. Because students represent a myriad of cultures and many faiths, the University of Florida is not able to assure that scheduled academic activities do not conflict with the holy days of all religious groups. Accordingly, individual students should make their need for an excused absence known in advance of the scheduled activities. The Florida Board of Education and state law govern university policy regarding observance of religious holidays. ¹¹¹¹_{SEPSEP}

The following guidelines apply:

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that he or she has been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Illness Policy: If a student is absent from classes or examinations because of illness, she or he should contact their instructors. Students should contact their college by the deadline to drop a course for medical reasons. Students can petition the [Dean of Students Office](#) to drop a course for medical reasons. The university's policy regarding [medical excuse](#) from classes is maintained by the Student Health Care Center. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.

Twelve-Day Rule: Students who participate in athletic or extracurricular activities are permitted to be absent 12 scholastic days per semester without penalty. (A scholastic day is any day on which regular class work is scheduled.) Instructors must be flexible when scheduling exams or other class assignments. The 12-day rule applies to individual students participating on athletic or scholastic teams. Consequently, a group's schedule that requires absence of more than 12 days should be adjusted so that no student is absent from campus more than 12 scholastic days. If a student previously has been warned about absences or unsatisfactory work, he or she should not incur additional absences, even if he or she has not been absent 12 scholastic days. It is the student's responsibility to maintain satisfactory academic performance and attendance.

EEL3211C	MAY 15 #01 53'	MAY17 #02 39'	MAY 19 #03 59'	MAY 22 #04 63'	MAY 24 #05 71'
MAY 26 #06 71'	MAY 29 HOLIDAY	JUN 02 #08 85'	JUN 05 #09 63'	JUN 07 #10 64'	JUN 09 #11 82'
JUN 12 #12 74'	JUN 13 REVIEW	JUN 14 TEST #1	JUN 16 NO CLASS	JUN 19 #13 87'	JUN 21 #14 50'
JUN 23 #15 61'	JUN 24-JUL 2 BREAK	JUN 27 #16 44'	JUN 29 #17 88'	JUL 01 #18 65'	JUL 04 HOLIDAY
JUL 06 #19 70'	JUL 08 #20 70'	JUL 11 #21 34'	JUL 13 #22 WES WHEELER	JUL 15 #24 53'	
JUL 18 #23 DONNIE THOMPSON	JUL 20 #25 64'	JUL 21 TEST #2 7P	JUL 22 NO CLASS		
JUL 23 DEERHAVEN TOUR	JUL 25 #26 21'	JUL 27 #27 54'	JUL 29 #28 CHUCK HAWKINS	AUG 01 #29	
AUG 03 #30	AUG 05 #31	EEL3211C LIST VIEW			

Video Class #1

Video Class #2

Video Class #3

Video Class #4

Video Class #5

Video Class #6

Video Class #7

Video Class #8

Video Class #9

Video Class #10

Video Class #11

Video Class #12

Video Class #13

Video Class #14

Video Class #15

Video Class #16

Video Class #17

Video Class #18

Video Class #19

Video Class #20

Video Class #21

Video Class #23

Video Class #24

Video Class #25

Video Class #26

Video Class #27

Video Class #29

LEGEND:

Matlab

Magnetic Cores

Transformers

Rotating_Machines

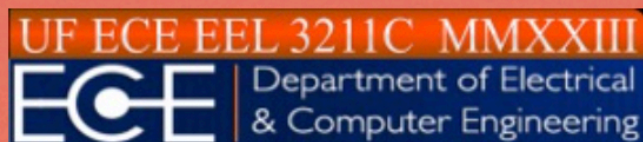
Synchronous_Machines

Induction_Machines

DC_Machines

Transmission_Lines.

APPENDIX A 3-PHASE



Summer 2023

EEL 3211C List View

EEL3211C	MAY 15 #01 53'	MAY17 #02 39'	MAY 19 #03 59'	MAY 22 #04 63'	MAY 24 #05 71'
MAY 26 #06 71'	MAY 29 HOLIDAY	JUN 02 #08 85'	JUN 05 #09 63'	JUN 07 #10 64'	JUN 09 #11 82'
JUN 12 #12 74'	JUN 13 REVIEW	JUN 14 TEST #1	JUN 16 NO CLASS	JUN 19 #13 87'	JUN 21 #14 50'
JUN 23 #15 61'	JUN 24-JUL 2 BREAK	JUN 27 #16 44'	JUN 29 #17 88'	JUL 01 #18 65'	JUL 04 HOLIDAY
JUL 06 #19 70'	JUL 08 #20 70'	JUL 11 #21 34'	JUL 13 #22 WES WHEELER	JUL 15 #24 53'	
JUL 18 #23 DONNIE THOMPSON	JUL 20 #25 64'	JUL 21 TEST #2 7P	JUL 22 NO CLASS		
JUL 23 DEERHAVEN TOUR	JUL 25 #26 21'	JUL 27 #27 54'	JUL 29 #28 CHUCK HAWKINS	AUG 01 #29	
AUG 03 #30	AUG 05 #31	EEL3211C LIST VIEW			

#1 EEL 3211C Flipped Classroom Methods (15').mp4
 #2 EEL 3211C Materials Expectations and Grading Policy (25').m4v
 #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

#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

Up and Running with MATLAB 90'

Ex_Files_UaR_MATLAB.zip

Hoover Dam 34'

Construction of The Hoover Dam.pdf

Creating an Asian Power Grid (9')

Uranium – Twisting the Dragon's Tail Part One

Uranium – Twisting the Dragon's Tail Part Two

Search for the Super Battery

Summer 2021 HW #1 Review

Summer 2022 HW #2 Review

Summer 2022 HW #3 Review

Summer 2021 HW #4 Review

Summer 2021 HW #5 Review

Summer 2021 HW #6 Review

Summer 2021 HW #7 Review

Summer 2021 HW # 8 Review

Summer 2021 HW # 8a Review

Summer 2021 HW #9 Review

Summer 2021 HW #10 Review

p22.mag

EEL3211C - Electrical Energy Conversion Laboratory

Summer 2023

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: David Blow

- a. Phone:
- b. Email: david.blow@ufl.edu

V. Class Nija TA: NA

VI. Meeting Location

Zoom

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-

<u>Week Of</u>	
May 15	<u>NO LAB</u>
May 22	Prelab Due , Perform Lab 0 (All students attend registered day)
May 24	TBD
May 29	TBD
Jun 05	TBD
Jun 12	TBD
Jun 19	TBD
Jul 03	TBD
Jul 10	TBD
Jul 17	TBD
Jul 24	TBD
Jul. 31	TBD

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. 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	Medium
3. An ability to communicate effectively with a range of audiences	
4. 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	Medium
5. 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	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium