



**Quizzes:** There will be a 60 minute quiz each week (except for exam weeks). The quizzes are self-paced online between the hours of 6 am and midnight each Thursday in the ECS Moodle Quiz activity. The quiz must be completed in one session (no starting/stopping with a break) in a timed one continuous hour. The quizzes are “once and done” with only one submission allowed.

**Exams:** There will be two 75 minute midterm exams and a two hour final exam during the semester. The exams are timed online tests at the scheduled lecture time and completed using the ECS Moodle Quiz module. The instructor may alternately give a scheduled traditional in-class exam at his discretion. The student will use the online access of their choice and should make appropriate arrangements to take the exam online during the scheduled day/time. Exams are not self-paced and are taken ONLY during the scheduled class time. The exams are “once and done” with only one submission allowed.

**Prior written permission** is required for all make-up exams and then only with compelling reasons.

**Grading Policy:** Grades may be curved at the instructor’s discretion. The class average will be in the B range. Typical grades ranges are:

“A” 94.5 and above    “A-” 89.5 to 94.49

“B+” 87.5 to 89.49    “B” 83.5 to 87.49    “B-” 79.5 to 83.49

“C+” 77.5 to 79.49    “C” 73.5 to 77.49    “C-” 69.5 to 73.49

“D+” 67.5 to 69.49    “D” 63.5 to 67.49    “D-” 59.5 to 63.49

F Below 59.5

## EEE 146 - Section 1 - Course Outline – Spring 2021

Week	Date	Chapter	Topics:
1	01-26 01-28	1.1 – 1.3 1.4 – 1.5	Converter Classification, Power Electronics Overview Electronic Switches and Switch Selection
2	02-02 02-04	1.6 – 1.7 2.1 – 2.3	Simulating Switches Power Computations, L and C
3	02-09 02-11	2.4 – 2.6 2.7 – 2.8	Energy Recovery, RMS, Apparent Power Sinusoidal and Nonsinusoidal Power Computations
4	02-16 02-18	2.9 3.1 – 3.2	Power Computations in Simulation Half-Wave Rectifier with Resistive Load
5	02-23 02-25	3.3 – 3.4 <b>Exam 1</b>	Resistive-Inductive load and Simulation computations <b>Chapters 1 and 2 Online exam</b>
6	03-02 03-04	3.5 – 3.6 3.7 – 3.8	RL-Source Load, Inductor-Source Load Freewheeling Diode, HWR with Cap Filter
7	03-09 03-11	3.9 – 3.10 4.1 – 4.2	Controlled HWR, Simulation Single-Phase Full-Wave Rectifiers
8	03-16 03-18	4.3 – 4.4 4.5 – 4.6	Controlled FWR, Three-Phase Rectifiers Controlled TPR, DC Power Transmission
9	03-23 03-25		<b>Spring Break</b>
10	03-30 04-01	10.1 – 10.2 10.3, 10.5, 10.8	MOSFET and IGBT Drive Circuits BJT Drivers, Transistor Snubbers, Heat Sinks
11	04-06 04-08	6.1 – 6.2 <b>Exam 2</b>	DC-DC Converters <b>Chapters 3, 4 and 10 Online exam</b>
12	04-13 04-15	6.3 – 6.4 6.5	The Buck (Step-Down) Converter The Boost (Step-Up) Converter
13	04-20 04-22	6.6 - 6.7 7.1 – 7.2	The Buck-Boost Converter, The Cuk Converter DC Power Supplies, Transformer Models
14	04-27 04-29	7.3 – 7.4 8.1 – 8.3	Flyback Converter, Forward Converter Full-bridge converter, Square-wave inverters
15	05-04 05-06	8.4 - 8.7 8.15 - 8.16	Fourier Series Analysis, Total Harmonic Distortion Simulation of Square-Wave Inverters
16	05-11 05-13		Course wrap-up
17	05-20	<b>Final Exam</b>	<b>Chapters 6, 7 and 8 Online exam</b> <b>Thursday May 20, 2021 12:45 P.M. to 2:45 P.M.</b>

### EEE 146 – Quiz, homework, and video assignments

Due Dates below are only approximate – see the online schedule for actual deadlines

Week	Date	Online Quiz	Online Homework	Online Videos
1	01-26 01-28			Section 1.1 to 1.3 Section 1.4 to 1.5
2	02-02 02-04	Q1 - Ch 1	Hmwk 01 - 1.1 to 1.5	Section 1.6 to 1.7 Section 2.1 to 2.3
3	02-09 02-11	Q2 - Ch 1	Hmwk 02 – 1.6, 1.7, 2.1 to 2.3	Section 2.4 to 2.7
4	02-16 02-18	Q3 - Ch 2	Hmwk 03 – 2.4 to 2.7	Section 2.8 to 2.9
5	02-23 02-25	<b>Exam 1</b>	Hmwk 04 – 2.8 to 2.9	Section 3.1 to 3.4
6	03-02 03-04	Q4 - Ch 3	Hmwk 05 – 3.1 to 3.4	Section 3.5 to 3.8
7	03-09 03-11	Q5 - Ch 3	Hmwk 06 – 3.5 to 3.8	Section 3.9 to 3.10 Section 4.1 to 4.2
8	03-16 03-18	Q6 - Ch 3	Hmwk 07 – 3.9 to 3.10, 4.2	Section 4.3 to 4.6
9	03-23 03-25	<b>Spring Break</b>		
10	03-30 04-01	Q7 - Ch 4	Hmwk 08 – 4.3 to 4.6	Section 10.8 Section 6.1 to 6.2
11	04-06 04-08	<b>Exam 2</b>	Hmwk 09 – 10.1, 10.3, 10.5, 10.8	
12	04-13 04-15	Q8 - Ch 10	Hmwk 10 – 6.2 to 6.3	Section 6.3 to 6.5
13	04-20 04-22	Q9 - Ch 6	Hmwk 11 – 6.4 to 6.5 and 6.13	Section 6.6 to 6.7 Section 7.1 to 7.2
14	04-27 04-29	Q10 – Ch 6	Hmwk 12 – 6.6 to 6.7, and 6.11	Section 7.3 to 7.4 Section 8.1 to 8.3
15	05-04 05-06	Q11 - Ch 6	Hmwk 13 – 7.2 - 7.4, and 7.12	Section 8.4 to 8.5 Section 8.7 to 8.16
16	05-11 05-13	Q12 - Ch 7	Hmwk 14 - 8.2 - 8.5, 8.7, 8.15 and 8.16	
17	05-20	<b>Final's Week</b>		

## Material Covered by Chapter and Section

Chapter 1 Power Electronics Concepts	Section 1.1 – Introduction
	Section 1.2 – Converter Classification
	Section 1.3 – Power Electronics Concepts
	Section 1.4 – Electronic Switches
	Section 1.5 – Switch Selection
	Section 1.6 and 1.7 – Power Electronics Simulation
Chapter 2 Power Computations	Section 2.1 - Introduction
	Section 2.2 – Power and Energy
	Section 2.3 – Inductors and Capacitors
	Section 2.4 – Energy Recovery
	Section 2.5 – Effective Values: RMS
	Section 2.6 – Apparent Power and Power Factor
	Section 2.7 – Power Computations for Sinusoidal AC Circuits
	Section 2.8 – Power Computations for NonSinusoidal Periodic Waveforms
Section 2.9 – Power Computations Using Simulation	
Chapter 3 Half-Wave Rectifiers	Section 3.1 - Introduction
	Section 3.2 – Resistive Load
	Section 3.3 – Resistive-Inductive Load
	Section 3.4 – Simulation to Determine Numerical Computations
	Section 3.5 – RL-Source Load
	Section 3.6 – Inductor-Source Load
	Section 3.7 – The Freewheeling Diode
	Section 3.8 – Half-Wave Rectifier with a Capacitor Filter
	Section 3.9 – The Controlled Half-Wave Rectifier
	Section 3.10 – Simulation of Controlled Rectifiers
	Section 3.11 – Commutation
Chapter 4 Full-Wave Rectifiers	Section 4.1 - Introduction
	Section 4.2 – Single-Phase Full-Wave Rectifiers
	Section 4.3 – Controlled Full-Wave Rectifiers
	Section 4.4 – Three-Phase Rectifiers
	Section 4.5 – Controlled Three-Phase Rectifiers
	Section 4.6 – DC Power Transmission
	Section 4.7 – Commutation: Effect of Source Inductance
Chapter 6 DC-DC Converters	Section 6.1 - Introduction
	Section 6.2 – A Basic Switching Converter
	Section 6.3 – The Buck (Step-Down) Converter
	Section 6.4 – Buck Circuit Design Considerations
	Section 6.5 – The Boost (Step-Up) Converter
	Section 6.6 – The Buck-Boost Converter
	Section 6.7 – The Ćuk Converter
	Section 6.11 – Discontinuous-Current Operation
Section 6.13 – Simulation of DC-DC Converters	

Chapter 7 DC Power Supplies	Section 7.1 - Introduction
	Section 7.2 – Transformer Models
	Section 7.3 – The Flyback Converter
	Section 7.4 – The Forward Converter
	Section 7.12 – Simulation of DC Power Supplies
Chapter 8 Inverters	Section 8.1 - Introduction
	Section 8.2 – The Full-Bridge Converter
	Section 8.3 – The Square-Wave Inverter
	Section 8.4 – Fourier Series Analysis
	Section 8.5 – Total Harmonic Distortion
	Section 8.6 – Simulation of Square-Wave Inverters
	Section 8.7 – Amplitude and Harmonic Control
	Section 8.15 – Three-Phase Inverters
Section 8.16 – Simulation of Three-Phase Inverters	
Chapter 10 Drive Circuits, Snubber Circuits, and Heat Sinks	Section 10.1 - Introduction
	Section 10.2 – MOSFET and IGBT Drive Circuits
	Section 10.3 – Bipolar Transistor Drive Circuits
	Section 10.5 – Transistor Snubber Circuits
	Section 10.8 – Heat Sinks and Thermal Management

### ECS Moodle Tips and Hints

1. The homework is available three weeks prior to the due date. You can “Submit” the homework as many times as you wish. I suggest you start the homework early and bring questions into class. You will NOT be able to see any assignment you did not complete (by submitting the assignment).
2. All quizzes are ONE submission only. During the quiz you will be able to “check” your answer. Wrong answers will receive a penalty of about 33% and you will be allowed up to three tries for each part of a problem. The computer will automatically submit your quiz at the end of the 60 minutes allowed for the quiz.
3. All exams are ONE submission only. During the exam you will be able to “check” your answer. Wrong answers will receive a penalty of about 33% and you will be allowed up to three tries for each part of a problem. The computer will automatically submit your exam at the end of the 60 minutes allowed for the exam. You must quickly send me your original work for my review if you feel a question was scored incorrectly or incompletely.
4. Periodically review your grade in the Moodle Gradebook. Bring to my attention any error or anomaly as soon as possible.

Entering questions answers into Moodle:

In most cases, you will be entering a number into Moodle as the answer to a calculation.

The following table shows you acceptable and not acceptable forms of an answer.

Intended Answer	Acceptable alternatives	Non-Acceptable
0.5	.5, 0.5, 0.500, 5e-1, 5E-1	1/2, 50%, 10/20, 20/40, ....
10,000	10000, 10E3, 10e3	10,000 (no comma allowed)
-40	-40, -40.00, -4E1, -4e1	
$\pi$ (pi)	3.14159 (as many digits as you care to use)	pi
Algebraic symbols	I will not ask you to enter equations symbolically into Moodle.	Do not enter common math symbols such as +, -, X, /, ln, e, and so on as an equation. 2+2 is not acceptable, enter “4” 2-2 is not acceptable, enter “0” And so on.