American Public University System

American Military University American Public University

ELEN315 16

Course Summary

Course : ELEN315 Title :

Length of Course : 16 Faculty :

Prerequisites : N/A Credit Hours :

Description

Course Description:

Course Scope:

At the end of this course you will have an understanding of energy conversion in electrical, electromagnetic, electromechanical, and electrochemical systems.

Objectives

After completing the course, the student should be able to accomplish these Learning Objectives (LO):

1 . Compare and contrast the advantages and disadvantages of various energy conversion systems.
2. Evaluate and describe the operation of single and multiphase AC generators..
3. Compare and contrast the advantages and disadvantages of AC and DC motor systems.
4. Demonstrate the various interfaces used to control energy conversion systems
5. Describe the primary types of transmission lines and cables and explain their key properties and li mitations.
6. Differentiate between the various types of transformers and their operational characteristics.

Outline

Week 1: Electromagnetic Fundamentals

Learning Outcomes

Physics Review

Magnetic Fields

Faradays Law

Induced currents and voltages

Electric and magnetic circuits

Power in AC Circuits

(LO-1, LO-2, LO-3, LO-4, LO-6)

Required Readings

Chapter 2 and 5

Assignments

Week 1 Assessment

Introduction Discussion

Power Discussion

Week 2: Three-Phase Circuits

Learning Outcomes Generation

of 3-Phase Voltages

Wye and Delta Connections

Power in 3-Phase Circuits

Analysis of Balanced Systems

One-line diagrams

The power triangle

(LO-1, LO-2)

Required Readings

Chapter 4

Assignments

Week 2 Assessment

Power Discussion

Week 3: Transformers

Learning Outcomes

Types and construction

Single-phase transformers

Equivalent Circuits Voltage

regulation and efficiency

(LO-4, LO-6)

Required Readings
Chapter 6

Assignments

Electrical Grid Discussion

Week 4: More Transformers

Learning Outcomes

Autotransformers

Three-phase transformers

Ratings and Related Problems

(LO-4, LO-6)

Required Readings

Chapter 6

Assignments

Week 4 Assessment

Electrical Grid Discussion

Week 5: Exam review

Learning Outcomes

Electromagnetic Fundamentals

Three-Phase Circuits

Transformers

(LO-1, LO-2, LO-3, LO-4, LO-6)

Required Readings

None

Assignments

Exam 1

Midterm Reflections Discussion

Week 6: AC Machinery Fundamentals

Learning Outcomes

Rotating Magnetic Field

Energy conversion process

Magnetomotive Force in AC

Machines

The Maxwell Stress Tensor

Field description of electromagnetic force Induced Voltage in AC Machines

Saturation and hysteresis

Induce torque in AC machines

Eddy currents in saturating iron

Power Flows and Losses

(LO-2, LO-3)

Required Readings

Chapter 8

Assignments

Week 6 Assessment

Electric Car Discussion

Week 7: Synchronous Machines

Learning Outcomes

Construction

Speed and Voltage

Analysis

The synchronous generator

Synchronous motors

Steady-state operation

Ratings

(LO-2, LO-3)

Required Readings

Chapter 9

Assignments

Electric Car Discussion

Week 8: More Synchronous Machines

Learning Outcomes

Paralleling Generators

Characteristics

Operation with large power systems

Operation with other generators

(LO-2, LO-3)

Required Readings

Chapter 9 Assignments

Week 8 Assessment

Explaining Synchronous Machines Discussion

Week 9: Induction Motors

Learning Outcomes Basic

Operation

Equivalent Circuits

Power and Torque

Starting induction motors

Speed control

Circuit Models

(LO-3)

Required Readings

Chapter 13 Assignments

Week 9 Assessment Explaining Synchronous Machines Discussion

Week 10: Exam Review

Learning Outcomes AC

Machinery Fundamentals

Synchronous Machines

Induction Motors

(LO-2, LO-3)

Required Readings

None

Assignments

Exam 2

Power Engineering Discussion

Week 11: DC Motors

Learning Outcomes

Simple DC Machines

Commutation in Real Machines

Power flow and loss

Types of DC Motors

Equivalent Circuit

(LO-3)

Required Readings

Chapter 1 4

Assignments

AC vs DC Discussion

Week 12: More DC Motors

Learning Outcomes

Permanent-Magnet DC Motors

Series DC Motor

Compounded DC Motor

(LO-3)

Required Readings

Chapter 15

Assignments

Week 12 Assessment

AC vs DC Discussion

Week 13: Transmission Lines

Learning Outcomes

Resistance

Reactance

Models

Characterization

Traveling waves

Two-port networks

(LO-5)

Required Readings

Chapter 3

Assignments

Week 13 Assessment

Public Perception Discussion

Week 14: Node Equations

Learning Outcomes One-

Line Diagrams

Equivalent Circuits

Node Equations Solutions to

Power Node Equations

(LO-1, LO-4)

Required Readings

Chapter 1 1

Assignments

Week 14 Assessment

Public Perceptions Discussion

Week 15: Power Flow Studies Power Electronics

Learning Outcomes

Techniques for power-flow studies

Adding generators to power-flow Information

in power-flow studies

Power electronics

(LO-1, LO-2, LO-3, LO-4, LO-6)

Required Readings

Chapter 12 Introduction to Power

Electronics, A Tutorial

Assignments

Week 15 Assessment

Week 16: Final Exam

Learning Outcomes

All Course Topics

(LO-1 , LO-2,LO-3, LO-4, LO-5, LO-6)

Required Readings

None

Assignments

Exam 3

Final Course Reflections Discussion

Evaluation

Instructor announcements: Weekly announcements will appear on Monday of each week in the online classroom. The announcement will discuss the assignments for the week along with any other pertinent information for the week.
This is an upper level course; all students' work is to be presented as such in terms of quality and content. The grading system will be based on your participation in the discussions, weekly assignments, and exams.

Reading Assignments: Please refer to the Course Outline section of this syllabus for the weekly reading assignments.

Week 1 Introductions: Within 7 days of course start, each student must log into the classroom and introduce yourself to the class. This is a required assignment and your introduction is due by Sunday of Week 1 . Your initial post should be at least 250 words. Please respond to at least 2 other students. Responses should be a minimum of 100 words and include direct questions. This discussion submission serves as your official entry into the course. This Introduction Discussion must be submitted the first week of the course, by 11:59 p.m., ET, on Sunday to maintain your registration in the course. Students who do not make a 250 word post to this discussion by 11:59 p.m., ET, Sunday will be automatically dropped from the course.

Weekly Discussions: The weekly discussion is for students to post their questions on course content for that week. This discussion should not be used to discuss specific test questions prior to receiving feedback from the instructor (after the test is graded). If there is a question on a specific question, find a similar problem in the book and ask a question on that problem or concept. Asking specific questions on test questions creates an unfair advantage and defeats the purpose of the assessment tool. Specific topics will occur throughout the course and will require critical thought/research for your input — be sure to keep up with ongoing discussions! Discussion Board posting are graded at the end of the session and constitute a portion of your final grade,

Weekly Assignments: There will be ten assignments during the course worth 31 % of the course grade. Each weekly assignment will cover one or more chapters in the book used in this course. For all problems requiring mathematical calculations, all work must be shown.

Exams: There will be two exams worth 25% (12.5 each) of the grade and a Final Exam worth 25% for a total of 50%.
Exams will be open book, open note tests. Students must complete the numbered exam by the end of the week indicated in the schedule.

Grading:

Name [redacted]	Grade % [redacted]
Exams	50.00 %
Exam 1	12.50 %
Exam 2	12.50 %
Final Exam	25.00 %
Discussions	19.00 %
Introduction Discussion	1.90%
Week 1: Power	1.90 %
Week 3: The Electrical Grid	1.90%
Week 5: Midterm Reflections	1.90%
Week 6: Electic Cars	1.90 %
Week 8: Explaining Synchronous Machines	1.90 %
Week 10: Power Engineering	1.90%
Week 11: AC vs DC	1.90 %
Week 13: Public Perception	1.90 %
Week 16: Final Course Reflections	1.90 %
Assignments	31.00 %
Week 1 Assignment	3.10%
Week 2 Assignment	3.10%
Week 4 Assignment	3.10%
Week 6 Assignment	3.10%
Week 8 Assignment	3.10%
Week 9 Assignment	3.10%
Week 12 Assignment	3.10%
Week 13 Assignment	3.10%
Week 14 Assignment	3.10%
Week 15 Assignment	3.10%

Materials

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- Tutor.com offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 1 0 free hours* of tutoring provided

  by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the API-JS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.

  •You are expected to submit assignments by the due dates listed in the classroom. Late assignments may not be accepted after the course end date. Submitting an assignment late may result in a penalty of up to 10% of the grade per day late, not to exceed a maximum of 50% (5 days late). The amount of the penalty is at the faculty member's discretion.*
- *Programs with specialty accreditation and students with DSA accommodations may have different late policies applied. As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Communicating on the Discussion

- Discussions are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the discussion. The purpose of the discussions is to actively participate in an on-going discussion about the assigned content.

, "Substantive" means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says "I agree" is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.

- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

University Policies

Communications

Student Communication

To reach the instructor, please communicate through the MyClassroom email function accessible from the Classlist of the Course Tools menu, where the instructor and students email addresses are listed, or via the Office 365 tool on the Course homepage.

- In emails to instructors, it's important to note the specific course in which you are enrolled. The name of the course is at the top center of all pages.
- Students and instructors communicate in Discussion posts and other learning activities.
- All interactions should follow APUS guidelines, as noted in the Student Handbook, and maintain a professional, courteous tone.
- Students should review writing for spelling and grammar.
- Tips on Using the Office 365 Email Tool

Instructor Communication

The instructor will post announcements on communications preferences involving email and Instant Messaging and any changes in the class schedule or activities.

- Instructors will periodically post information on the expectations of students and will provide feedback on assignments, Discussion posts, quizzes, and exams.
- Instructors will generally acknowledge student communications within 24 hours and respond within 48 hours, except in unusual circumstances (e.g., illness).
- The APUS standard for grading of all assessments (assignments, Discussions, quizzes, exams) is five days or fewer from the due date.
- Final course grades are submitted by faculty no later than seven days after the end date of the course or the end of the extension period.

University Policies

Consult the Student Handbook for processes and policies at APUS. Notable policies:

- Drop/Withdrawal Policy
- Extension Requests
- Academic Probation
- Appeals
- Academic Dishonesty / Plagiarism
- Disability Accommodations
- Student Deadlines
- Video Conference Policy

Mission

The mission of American Public University System is to provide high quality higher education with emphasis on educating the nation's military and public service communities by offering respected, relevant, accessible, affordable, and student-focused online programs that prepare students for service and leadership in a diverse, global society

Minimum Technology Requirements

- Please consult the catalog for the minimum hardware and software required for undergraduate and graduate courses.
- Although students are encouraged to use the Pulse mobile app with any course, please note that not all course work can be completed via a mobile device.

Disclaimers

- Please note that course content – and, thus, the syllabus – may change between when a student registers for a course and when the course starts.
- Course content may vary from the syllabus' schedule to meet the needs of a particular group.