EE 440 – Electric Machinery
3 (2, 3) [Semester Credit Hour (Lecture, lab)]

COURSE SYLLABUS: Fall 2024

INSTRUCTOR INFORMATION

Instructor: Nizar Tayem, PhD
Associate Professor, Electrical Engineering
Department of Engineering and Technology

Office Location: AG/ET 218
Office Hours: Wednesday (10:00 AM –12:00 PM)

Office Phone: 903-886-5706
Office Fax: 903-886-5960 (Inform instructor when fax is sent)

University Email Address: Nizar.Tayem@tamuc.edu

Preferred Form of Communication: email
Communication Response Time: 24 hours (weekdays) to email

COURSE INFORMATION

Materials - Textbooks, Readings, Supplementary Readings

Course Format:

The class consists of lectures and Laboratory exercises. The Lecture will be conducted on Tuesday and Lab exercise will be on Thursday.

Class Meeting Schedule: Meets 8/26/2024 through 12/13/2024.
Class Meeting Dates: Monday Lecture: (12:30 PM– 2:30 PM)
Wednesday Lab: (12:30 PM– 2:30 PM)

Classroom: AG/ET 215 **Laboratory**: AGIT126F

The *syllabus/schedule are subject to change.*

Textbook(s) Required:
Stephen J Chapman, Electric Machinery Fundamentals**, fifth Edition, McGraw-Hill Education, 2011.** ISBN-13: **978-0073529547**

Lab Manual:

Lab Manual is provided by the instructor

Software Required:

Microsoft Office - MS Word, Excel, Power-point
MATLAB
LABVIEW

Course Description:

This course studies the design and the performance of electrical machines during the steady state and transients. The topics covered include the operational principles of direct current electrical machines, single phase and three phase circuits, voltage regulation, transformers, motors, and generators. This course also provides an introduction to electric power systems. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment.

Prerequisites: EE 340 with a minimum grade of C.

Student Learning Outcomes:

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

1. Describe the basic principles of electromagnetic induction and torque generation.
2. Draw diagrams showing equivalent circuits of two-winding transformers and electrical machines.
3. Analyze transformer performance using the equivalent circuit
4. Study the characteristics and applications of different DC machine types
5. Evaluate the performance of DC machines.
6. Evaluate the performance of synchronous generators
7. Use approximate circuit models to predict the performance of induction machines
8. Recognize the structure of a power system and main components
9. Perform experiments on transformers, DC machines, synchronous generator and three phase induction motors
10. Interpret and analyze experimental results
11. Write technical reports

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COURSE REQUIREMENTS:

Minimal Technical Skills Needed

Working knowledge and basic skills using Microsoft Word, Excel, and PowerPoint.

Instructional Methods:

The instructional methods in this course include lectures, class discussion, course project, written assignments, problem solving, writing a lab report, lab exercises, open ended problems, case study, and simulation assignments using software.

Instruction will be based on the course textbook and the lab manual.

Student Responsibilities or Tips for Success in the Course:

Attendance:

Attendance is a requirement for this course. The instructor will take attendance at each class. Class Attendance Requirement (one lateness = 1/2 absence)

# of Absences	0 – 3	4	5	6	7	>7
Point Deduction	0	- 5	- 10	- 20	- 30	F

Unless directed and/or approved by the instructor, only MS Office-compatible formats (.doc, .docx, .rtf, .xls, .xlsx, .ppt and .pptx) will be accepted for assignments and submissions. NO OTHER DOCUMENT OR FILE FORMATS WILL BE ACCEPTED.

Failure to comply with required document formats will result in late or rejected assignments (zero credit).

Other specific formats may be dictated based on assignment and will be coordinated with/by the instructor prior to submission to assignment drop boxes.

Microsoft Word, Excel, PowerPoint, or Project files will be placed in the assigned drop boxes in eCollege in the accepted formats only (identified above). **Note**: Many students do not fully utilize the power within this document processing software. This can assist the user when they know how to use more of the functions in these standard tools. The use of the spelling and grammar checkers, page and section breaks, and APA templates is highly encouraged PRIOR to submission of assignments.

APA Formatting is required for all reports assigned during this class. Non-adherence to APA formatting will result in points deduction on the assignment.

GRADING:

The final course grade is based on 100 possible points (as described below in Assessments) and will be calculated based on the following grading scale:

Grading Scale:
A = 90-100 points
B = 80-89 points
C = 70-79 points
D = 60-69 points
F = < 60 points

Assessments:

The following assessments will be performed throughout this course to assess individual progress toward learning outcomes. The final course grade will be calculated based on the following assessments:

Assessment task	Due Time	Weight
Homework	4, 6, 10	15 %
Class Activities	Bi-Weekly	10 %
Midterm Exam	8	20 %
Final Exam/Design Project	16	25 %
Laboratory exercises	Bi-Weekly	30 %

Homework Assignments: Homework Assignments are due at the beginning of class, delivered in the appropriate drop box. No late submissions will be accepted. Some homework assignments will include the submission of simulation files created in LVSIM-EMS or any. Any file that is flagged as infected with malware or viruses will receive a grade of zero. The instructor will use Norton Internet Security, and the student is advised to use something at least as good as NIS.

Exams and Class Activities
The two major examinations and class activities will be performed in the class.

Lab Safety Training: Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Design Project: Students are required to complete a course design project and submit a comprehensive report at the end of the course. The project should demonstrate the

student’s ability to link the theoretical knowledge and practical skills acquired in the

course to real-world applications. Students will work in groups of up to three students. Students will submit their project proposal in week 8 to the instructor for approval.

Lab Exercises:

This lab addresses the principles of electrical transformers and machinery, their analysis and design. Students will acquire practical skills through performing several experiments using single and three phase transformer, induction motors, Auto transformers, synchronous generators, and speed-torque characteristics and synchronization. Student also are required to complete a design project based on real world applications.

There will be 7 Lab Assignments distributed over the semester and final lab exams. Students will work in groups of up to four students.

Grading Policy for the Lab:

Assessment task	**Due Time**	**Weight**
Lab Work & Report	Weekly	25 %
Lab Final Exam	15	5 %

Pre-labs must be completed prior to coming to lab. Students will be turned away from the Lab if the Pre-lab is not complete.

Formal Lab Reports should follow the same approach used in the lab, which is a Hypothesis/Test sequence. In Prelab, you will be asked to design a circuit to perform a specific function. During the lab time you built the circuit and collected test data to show how the circuit performed. The report, then, should be constructed as follows:

1. **Cover page**: Your lab report cover page should include the following information:
    - Course name and title
    - Experiment number and title
    - Names of group members and their IDs
    - Instructor's name.
    - Date
2. **Objectives**: State clearly the objectives of the experiment
3. **Equipment required**: List all the equipment and components used in the experiments
4. **Introduction:** Provide the necessary background to the problem that you are trying to solve in the lab and the approach to solve it.
5. **Procedure:** Each part of the lab experiment should explain the following**:**

- Basic measurements and calculation
- Explanation of the derived solution
- Schematics developed that demonstrate the solution

6. **Results and Analysis**: Each part of lab experiment should have the following:

   - Include tests used to prove the solution worked.
   - Include drawing of the solution you built in lab.
   - State the observations made while performing the lab and an explanation of your results

7. **Conclusions:** In this section of the lab:
   - Describe what you did and learned from the lab.
   - Explain at what degree the objectives of the lab were achieved.
   - Describe possible real time applications from the work done in the lab

A Formal Lab Report should enable someone else to duplicate your work and obtain the same results without reference to any other documents. This does not mean that you should append data sheets to your report but that the schematics and parts layout should be clear and accurate.

Submit the files containing the circuit simulation, a schematic, and data which explain the lab results you obtained. Graphics must be created using a graphics program. Graphics in your lab reports may not be hand-drawn.

Lab Reports are due as hardcopy and by submission to the drop-box before lab time one week after the lab was performed. 10% per day will be deducted from the final lab grade for each 24 hours or portion thereof that a lab is late. Hardcopy of Lab Reports are to be submitted to the instructor.

Student Outcomes (ABET):
The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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
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
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
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

This course will assess the achievement of the following student outcomes:

- 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 (2)
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (6)
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies (7)
- 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 (5)

TECHNOLOGY REQUIREMENTS

- To fully participate in online courses, you will need to use a current Flash enabled internet browser. For PC and Mac users the suggested browser is Mozilla Firefox.

- You will need regular access to a computer with a broadband Internet connection. The minimum computer requirements are:
    - 512 MB of RAM, 1 GB or more preferred
    - Broadband connection required courses are heavily video intensive
    - Video display capable of high-color 16-bit display 1024 x 768 or higher resolution

- You must have a:
    - Sound card, which is usually integrated into your desktop or laptop computer
    - Speakers or headphones.
    - *For courses utilizing video-conferencing tools and/or an online proctoring solution, a webcam and microphone are required.

- Both versions of Java (32 bit and 64 bit) must be installed and up to date on your machine. At a minimum Java 7, update 51, is required to support the learning management system. The most current version of Java can be downloaded at:

The *syllabus/schedule are subject to change.*

JAVA web site http://www.java.com/en/download/manual.jsp

- Current anti-virus software must be installed and kept up to date.

- You will need some additional free software (plug-ins) for enhanced web browsing. Ensure that you download the free versions of the following software:
  - Adobe Reader https://get.adobe.com/reader/
  - Adobe Flash Player *(version 17 or later)* https://get.adobe.com/flashplayer/
  - Adobe Shockwave Player https://get.adobe.com/shockwave/
  - Apple Quick Time http://www.apple.com/quicktime/download/

- At a minimum, you must have Microsoft Office 2013, 2010, 2007 or Open Office. Microsoft Office is the standard office productivity software utilized by faculty, students, and staff. Microsoft Word is the standard word processing software, Microsoft Excel is the standard spreadsheet software, and Microsoft PowerPoint is the standard presentation software. Copying and pasting, along with attaching/uploading documents for assignment submission, will also be required. If you do not have Microsoft Office, you can check with the bookstore to see if they have any student copies.

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's

home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here: https://community.brightspace.com/support/s/contactsupport

COMMUNICATION AND SUPPORT

Interaction with Instructor Statement

The instructor's communication response time and feedback on assessments are stated clearly.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Attendance/Lateness, Late Work, Missed Exams and Quizzes and Extra Credit

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette
http://www.albion.com/netiquette/corerules.html

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

ADA Statement

Students with Disabilities

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services

http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

TAMU-C Pandemic Response

A&M-Commerce requires the use of face-coverings in all instructional and research classrooms/laboratories. Exceptions may be made by faculty where warranted. Faculty have management over their classrooms. Students not using face-coverings can be required to leave class. Repetitive refusal to comply can be reported to the Office of Students' Rights and Responsibilities as a violation of the student Code of Conduct.

Students should not attend class when ill or after exposure to anyone with a communicable illness. Communicate such instances directly with your instructor. Faculty will work to support the student getting access to missed content or completing missed assignments.

COURSE OUTLINE / CALENDAR

The instructor reserves the right to adjust the schedule in order to serve the needs of the class and any changes will be communicated in a timely manner.

Course schedule:

1. **Topics Covered (Tentative Schedule)**

Week	TOPICS	Chapter
1-2	AC power and analysis	Handout
3	Three-phase circuits and systems	Handout
4-5	Introduction to Machinery Principles	1
6-9	Transformers And Midterm exam	**2**
10- 11	Synchronous Generators	4
12-13	Induction Motors	6
14-15	DC Motors	8
16	Final Exam	Final Exam

The *syllabus/schedule are subject to change.*

Laboratory schedule:

Lab #	Experiment	Group A	Group B	Week
	Introduction to Power Lab			2
1	Single Phase AC Power Circuit	Hardware	Simulation	3
		Simulation	Hardware	4
2	Three Phase AC power Circuit	Hardware	Simulation	5
		Simulation	Hardware	6
3	Power Factor correction	Hardware	Simulation	7
		Simulation	Hardware	8
4	Single Phase power Transformer	Simulation	Simulation	9
5	Three Phase Power Transformer	Simulation	Hardware	10
		Hardware	Simulation	11
6	Single phase induction Motor	Simulation	Hardware	12
		Hardware	Simulation	13
7	Conventional DC Machine and Universal Motor	Simulation	Simulation	14
		Hardware	Hardware	15

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors ' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

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In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

The *syllabus/schedule are subject to change.*