EE 452.001 – Antenna Theory and Design

3 Credit Hours

COURSE SYLLABUS: FALL 2020

INSTRUCTOR INFORMATION

Instructor: Redha M. Radaydeh, PhD
Assistant Professor, Electrical Engineering
Department of Engineering and Technology
Office Location: AGIT 204
Office Hours: Monday & Wednesday 12:00-2:30 pm. Emails, chats & scheduled Zoom meetings with appointments.
Office Phone: 903-886-5471
Office Fax: 903-886-5960
University Email Address: Redha.Radaydeh@tamuc.edu
Preferred Form of Communication: email.
Communication Response Time: within 48 hours (weekdays) to email.

COURSE INFORMATION

Class Meeting Schedule: Meets 8/24/2020 through 12/11/2020.
Class Meeting Dates: Weekly meetings; **Monday 9:00-11:50 am.**
Classroom: Web-based class. Lectures will be given online via D2L.
Course Format: This course contains lectures, technology briefs and practical applications.

Materials – Textbooks, Readings, Supplementary Readings

Textbook Required:

- F. T. Ulaby and U. Ravaioli, Fundamentals of Applied Electromagnetics, 7th Ed., Pearson, 2015.

Optional references:

- C. Balanis, Antenna Theory: Analysis and Design, 3rd Ed., Wiley, 2005.

The *syllabus/schedule are subject to change.*

- W. L. Stutzman and G. A. Thiele, Antenna Theory and Design, 3rd Ed., Wiley, 2012.

Software Required:

- Microsoft Office - MS Word, Excel, PowerPoint
- MATLAB, LABVIEW, and/or EM simulators.

Course Description

This course presents an advanced material that specifically deals with time-varying electromagnetic (EM) waves and their transmission, propagation, and reflection in dielectric media, conducting media, and guided/unguided structures. The course presents the principles and applications of EM wave radiation and various antenna elements and antenna arrays. The course describes some practical applications of the covered topics, such as satellite systems, target detection, and radar.

Prerequisites: EE 340 with a minimum grade of C.

Learning Outcomes of Instruction:

1. Gain fundamental experience in EM wave radiation and antenna structures and characteristics.
2. Acquire systematic knowledge about Maxwell's equations for time-varying fields.
3. Gain knowledge on plane-wave propagation and polarization modes.
4. Learn the basic concepts of wave transmission and reflection at normal and oblique incidence.
5. Explain the EM wave propagation in waveguides and cavity resonators.
6. Learn the basic principles of antennas and EM wave radiation.
7. Describe the basic principles of satellite and radar systems.
8. Use modern software and numerical techniques, to improve teamwork and problem-solving skills.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

- Microsoft Office - MS Word, Excel, PowerPoint
- MATLAB, LABVIEW, and/or EM simulators.

Instructional Methods

The instructional methods will include lectures, discussions, technology briefs, assignments, problem solving, and simulations using software. Instructions will be based on the course textbook. Course materials, announcements, and lecture notes will be posted on the course website.

Student Responsibilities or Tips for Success in the Course

Student must attend classes, participate in class work and discussions, perform required course assessments supporting the anticipated learning objectives. Students are expected to regularly log into the course website to downloads course material, submit their course works as instructed, and follow up on new announcements. This course covers a more advanced content that requires at least 6 hours of extensive study per week.

Attendance Policy
Class Attendance Requirement (one lateness = 1/2 absence)

# of Absences	0 – 3	4	5	6	7	>7
Point Deduction	0	- 2	- 4	- 10	- 30	F

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% or Below

Assessments

The following assessments will be performed during this course to assess individual progress towards learning outcomes:

Assessment	Weight	Due time
Midterm Exam	35%	Week 8
Final Exam	35%	Week 16
Assignments	30%	Weeks 5 & 12

The *syllabus/schedule are subject to change.*

Relationship between Assessments and Course/Student Learning Outcomes

Learning Outcomes of Instruction	Assessment
1. Gain fundamental experience in EM wave radiation and antenna structures and characteristics.	Assignments
2. Acquire systematic knowledge about Maxwell's equations for time-varying fields.	Assignments, Exams
3. Gain knowledge on plane-wave propagation and polarization modes.	Assignments
4. Learn the basic concepts of wave transmission and reflection at normal and oblique incidence.	Exams
5. Explain the EM wave propagation in waveguides and cavity resonators.	Assignments
6. Learn the basic principles of antennas and EM wave radiation.	Exams
7. Describe the basic principles of satellite and radar systems.	Assignments
8. Use modern software and numerical techniques, to improve teamwork and problem-solving skills.	Assignments

Exams

The two exams will be closed book & closed notes. Relevant scientific formulas will be provided in supplementary sheet. The use of personal phone is strictly prohibited during exams. Student will need to bring a scientific calculator for exam. Makeup exam may be offered but an official permit for absence that fulfills University procedures should be available in a timely manner.

Assignments

Solutions should be submitted on the due date. Student will need to submit one solution report per homework assignment. Solutions of an assignment will be due one week from the day it assigned. Unless prior arrangements are made with the instructor, no late submission of assignment solutions will be permitted. Some homework assignments may require the submission of simulation files created in Multisim. Any file that is flagged as infected with malware or viruses will not receive a grade.

TECHNOLOGY REQUIREMENTS

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.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

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

Interaction with Instructor Statement

Preferred communication and response time to communication, as well as office hours are identified in the paragraphs above in this syllabus. Feedback on assessments and students' progress will be discussed in timely manner during class meetings.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

Attendance/Lateness, Late Work, Missed Exams and Quizzes are identified in the paragraphs above in this syllabus.

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:
https://www.britannica.com/topic/netiquette

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

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Graduate Student Academic Dishonesty 13.99.99.R0.10

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

Students with Disabilities-- ADA Statement

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.

COURSE OUTLINE & CALENDAR

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

Course schedule: The sequence of chapters follows the textbook.

Week	Topic	Chapter
1-3	Maxwell's equations for time-varying fields, transformer, and displacement current	6
4-6	EM plane-wave propagation, polarization, and power density	7
5	Assignment 1	
6-7	Wave transmission and reflection, optical fibers	8
8-9	Waveguides, TE and TM modes, and cavity resonators	8
8	Midterm Exam	
9-11	EM radiation, antenna structures and characteristics	9
12-13	Antenna arrays	9
12	Assignment 2	
14-15	Practical applications: satellite, radar, detection and sensing arrays	10
16	Final Exam	