



EE 497: Special Topics: Electronic Warfare
Section 01E, Course Syllabus, Spring 2025
Rev 0, 12/17/2024

INSTRUCTOR INFORMATION

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| Instructor | Gerald L. Fudge, PhD |
| Office Location | AG/ET 217 |
| Office Hours | Monday (2:30 pm – 5:00 pm) Tuesday/Thursday (9:30 am – 10:45 am) |
| Phone | E&T Office: 903-886-5474 |
| Office Fax | 903-886-5960 (Inform instructor when fax is sent) |
| University Email Address | Gerald.Fudge@tamuc.edu |
| Preferred Form of Communication | Email |
| Communication Response Time | Typically, within 48 hours on weekdays for email |

COURSE INFORMATION

| | |
|-------------------------------|---|
| Class Meeting Schedule | See schedule at end of syllabus |
| Class Meeting Dates | Tuesday / Thursday 11:00 am – 12:15 pm |
| Classroom | AG/ET 118A |
| Textbook(s) Required | <ol style="list-style-type: none"> 1. EW 101: A First Course in Electronic Warfare (Artech House Radar Library (Hardcover)) 1st Edition by David L Adamy. ISBN-10: 1580531695 2. Radar and Electronic Warfare, Rohde & Schwarz (provided by instructor) 3. Electronic Warfare Fundamentals, Nellis AFB, 2000 (provided by instructor) 4. Electronic Warfare and Radar Systems Engineering Handbook, NAVAIR, 2013 (provided by instructor) |
| Software Required | Microsoft Office, Matlab (provided by university) |

The syllabus/schedule are subject to change

COURSE DESCRIPTION

This course allows for studying emerging topics in electrical engineering that are not present in the curriculum. Topics of mutual interest to faculty and students can be explored with the approval of the department chairperson. This is an organized course and contains regular schedule, student course work, and regular classroom meetings. The course will be associated with laboratory work and simulation exercises using Matlab. This class will focus on passive Electronic Warfare.

Prerequisites: Upper level standing with instructor's consent.

Student Learning Outcomes

Upon successful completion of this course, students will achieve the following learning outcomes:

- Demonstrate a basic understanding of EW and the various engineering disciplines and EE specializations involved in EW
- Calculate receive power level given transmit parameters, frequency and distance
- Demonstrate ability to work in dB
- Describe EW receiver architectures and explain the key principles of these architectures
- Describe search & detection strategies
- Perform cascade analysis to estimate signal-to-noise ratio and processing gain from antenna to ADC
- Describe LPI signals and pulse compression concepts and compute pulse compression ratio
- Describe the conversion of real sampled data into in-phase / quadrature-phase data
- Demonstrate understanding of passive front-end EW receiver system design and tradeoffs between competing requirements such as bandwidth, probability of intercept, size, weight, power, cost, etc.
- Demonstrate the fundamentals of time-domain and time-frequency domain detection and measurement of common radar waveforms
- Describe geolocation methods involving measurements such as direction of arrival and time difference of arrival

COURSE REQUIREMENTS

Minimal Technical Skills Needed

The prerequisites capture the minimum technical skills needed at the start of the class. Although being able to use Matlab and Python is helpful, this is not required prior to starting the class.

Instructional Methods

The instructional methods in this course include lectures, class discussion and participation, lab projects using modeling tools such as Matlab and Python, homework assignments, and exams. This course will take a holistic approach as we integrate different knowledge fields in order to better prepare students for real-life situations that are more complex than standard textbook or classroom examples.

Student Responsibilities or Tips for Success in the Course

- **Attendance & Participation:** For optimum learning and grades, students need to attend class and participate in discussion, homework, project, and exams; note that attendance and participation is a graded component.

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- **Homework Assignments:** Working through example problems is a critical component to learning. The homework sets will include review problems in addition to problems illustrating new material. Homework will be assigned on average two to three times per month.
- **Submission of Assignments:** Students shall submit assignments either in class or in the assigned drop boxes on D2L (directions will be provided in class). If problems are encountered using D2L, then email may be used as a backup with instructor permission. Late work is not accepted, unless student has an acceptable excuse proven by a doctor's note or any legal documentation.
- **Collaboration:** Students are strongly encouraged to collaborate on assignments, but must turn in their own work.
- **Use of Artificial Intelligence (AI) Tools:** Students can use AI tools on assignments, but must cite the use of such tools appropriately, and are responsible for the correctness of their work.
- **Soft-Copy Report Formats:** Students should submit reports in PDF format and follow the style per the assignment requirements.
- **Exams:** The exams will be closed book & closed notes. Student should bring a scientific calculator. The use of a personal phone is prohibited during exams. A makeup exam may be offered but an official permit for absence that fulfills University procedures must be provided to the instructor in timely manner.
- **Final Project:** The final project will be a collaborative team exercise, with approximately 2-3 students per team. Each group will submit their project deliverables, and each student will submit a peer-review.

GRADING

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

| A | B | C | D | F |
|------------|--------------|--------------|--------------|-------|
| 100 – 90.0 | 89.99 – 80.0 | 79.99 – 70.0 | 69.99 – 60.0 | <60.0 |

Overall grades will be based on a weighted average as shown below:

| Assessment Type | Percent |
|------------------------------|------------|
| Homework | 30 |
| Participation and Attendance | 10 |
| Exams | 35 |
| Quizzes | 10 |
| Final Project | 15 |
| Total | 100 |

Note: There may also be opportunities for bonus points; these will be discussed in class.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by East Texas A&M University (ETAMU) 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

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

Use email and office hours as presented under instructor information. In addition, the instructor will provide mobile contact information.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

As described above, student attendance and participation are required for this class.

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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](#), and

- <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 ETAMU 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](#)
- [Undergraduate Student Academic Dishonesty Form](#)
- <http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/documents/13.99.99.R0.03UndergraduateStudentAcademicDishonestyForm.pdf>
- [Graduate Student Academic Dishonesty Form](#)
- <http://www.tamuc.edu/academics/graduateschool/faculty/GraduateStudentAcademicDishonestyFormold.pdf>
- <http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.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

East Texas A&M University

Velma K. Waters Library Rm 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/>

The Counseling Center at ETAMU, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center’s crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.tamuc.edu/counsel

Nondiscrimination Notice

ETAMU 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 ETAMU 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 ETAMU 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 ETAMU campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

COURSE OUTLINE / CALENDAR

| Wk | Days | | Unit / Topic | Notes |
|---|-------|-------|---|------------------------|
| | Tues. | Thur. | | |
| 1 | 1/14 | 1/16 | W1: Introduction to EW; radar link equation & dB | |
| 2 | 1/21 | 1/23 | W2: Matlab, SNR, and signal simulation | |
| 3 | 1/28 | 1/30 | W3: Matlab, SNR, cascade analysis | Census Day 29 |
| 4 | 2/4 | 2/6 | W4: Antennas, cascade analysis | |
| 5 | 2/11 | 2/13 | W5: IQ simulation, EW receivers, pulse compression | |
| 6 | 2/18 | 2/20 | W6: EW receivers, EW Search, Probability of intercept | |
| 7 | 2/25 | 2/27 | W7: LPI signals & modulation | |
| 8 | 3/4 | 3/6 | W8: Review -> Midterm | Midterm exam |
| 9 | 3/11 | 3/13 | W9: Spring Break, no class | |
| 10 | 3/18 | 3/20 | W10: System Engineering | |
| 11 | 3/25 | 3/27 | W11: Geolocation, SE block diagrams | |
| 12 | 4/1 | 4/3 | W12: Final project, geolocation | Project kickoff |
| 13 | 4/8 | 4/10 | W13: Active EW, Jamming, | |
| 14 | 4/15 | 4/17 | W14: Other topics in EW, review | |
| 15 | 4/22 | 4/24 | W15: Other topics in EW, review | |
| 16 | 4/29 | 5/1 | W16: Project presentations, review | Projects due! |
| | | | Final exam | Final exam |
| Notes: <ol style="list-style-type: none"> 1. Quizzes will be held at various times throughout the semester 2. Course outline / calendar subject to change as needed to meet needs of class | | | | |

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