

ECE 8710: Radar Systems

Class Meetings

Virtual-Online

Instructor

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Office Hours

Tuesdays, 9 am-12 pm, or by appointment. You can email your questions anytime.

Course Description

Radar systems are introduced in a framework of electronic systems integration which represents a unification of engineering theory and practice. A comprehensive set of radar principles are presented which form a foundation for the radar range equation. Systems applications are presented which illustrate the potentials and limitations of radar.

Course Objectives

1. Review of probability theory
2. Radar equations
3. Probability of detection and false alarm
4. Pulse repetition frequency
5. Radar cross-section
6. Doppler and MTI radars
7. Pulse Doppler Radar
8. Monopulse radar tracking
9. Low-angle radar tracking
10. Matched filter receiver
11. Radar Waveforms
12. Constant false alarm rate receivers
13. Ambiguity function and pulse compression
14. Phased arrays
15. MIMO Radar
16. Statistical performance bounds
17. High resolution radars
18. Radar for Civilian Applications

Grading Policy

Your final grade will be determined from the following:

- Homework: 75%
- Final Exam: 25%

The scale used to assign letter grades is:

Numerical Grade	Letter Grade	Numerical Grade	Letter Grade
A	92 to 100	C	65 to 70
A-	88 to 92	C-	63 to 65
B+	85 to 88	D+	60 to 63
B	80 to 85	D	57 to 60
B-	75 to 80	D-	50 to 67
C+	70 to 75	F	Less than 60

You may wish to have a statement here about your grading philosophy.

Attendance

Attendance is optional.

Course Materials

Fundamentals of Radar Signal Processing, Mark Richards, McGraw Hill

Introduction to Radar Systems, Third Edition, Merrill Skolnik, McGraw Hill

Instructor's Notes

Schedule

Homework will be assigned weekly or biweekly

Final exam is an oral presentation which analyzes a recent journal paper on radar signal processing published in reputable journals. Each presentation will last an hour. Depending on student schedule, the final exam could be divided into two days.

Academic Integrity

The College of Engineering is committed to creating an environment of academic integrity and ethical decision-making that we hope is reflected in the actions of our students and graduates. As Villanova students, integrity is central to the University mission. As engineers, our code of conduct requires us to place honor and integrity at the forefront of everything we do. As engineering students, it is expected that you will begin to adopt these values and instill them into your work habits. Students violating the academic integrity policy will receive a zero on that assignment or exam and the violation will be reported to the Associate Dean for Academic Affairs.

The University's academic integrity policy can be found here:

<https://www1.villanova.edu/villanova/provost/resources/student/policies/integrity.html>.

The College of Engineering has adopted the following exam guidelines:

- Students must arrive before the start of the exam. Under exceptional circumstances a student may need to arrive late, but he/she can enter the exam no later than 5 minutes after the start of the exam.
- All cell phones must be turned off and stored away until the student exits the exam room.
- The official Villanova class attendance policy must be followed when requesting excuses for absences or lateness to an exam.
- Each student must write and sign the following statement, *"I have neither given nor received any unauthorized assistance in the completion of this exam."*
- *Homework problems should be attempted by the students on their own.*

Students with Disabilities

It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability please contact me after class or during office hours to make arrangements.

If you have a non-physical disability you need to register with the Learning Support Office by contacting 610-519-5176 or at learning.support.services@villanova.edu as soon as possible. Registration is needed to receive accommodations.

The Office of Disability Services collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact and register with Gregory Hannah, advisor to students with disabilities @ 610-519-3209 or visit the office on the second floor of the Connelly Center.

Copyright Policy

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Attendance to the Student Code of Conduct

Students are expected to act in a professional and respectful manner to their fellow students, faculty, and staff. Students should become acquainted with and understand the responsibilities set forth in the Student Handbook, especially those in the sections on Policy and Regulations. Adherence to University regulations is expected and required for successful completion of the program of studies. Enforcement within the classroom of policies regarding classroom behavior is the responsibility of the faculty member. All other discipline problems are to be referred to the Dean of Students.

Professional Duties

It is important to note that teaching is one of the many duties that professors perform as part of their job responsibilities. In addition to teaching, professors perform research, advise graduate students, edit journals and review journal articles, serve on committees for the university and professional societies, travel to conferences to remain abreast of current developments and to present their results... to name just a few.