REMOTE SENSING IN ENGINEERING: SCIENCE, SENSORS, & APPLICATIONS
ABE 4034; EEL 3402
3 Credit hours
Class Periods: TR, 9:35-10:50 am (11:30 am for exams, make-up classes, & presentations)
Location: Rogers Hall Room 129
Academic Term: Fall 2025

Instructor:
Prof. Jasmeet Judge, Rogers Hall-205
Phone: +1 352 294 6750 Email: jasmeet@ufl.edu
Office hours: TR 10:50 -11:50 am (after class) or by appointment

Course Description
Develop an understanding of science and theory of remote sensing, systems used in remote sensing, and applications from information obtained in the visible/near infrared, thermal infrared and microwave regions of the EM spectrum.

Course Pre-Requisites/Co-Requisites
MAP 2302 or the equivalent

Course Objectives
The main objective of the course is to develop an understanding of remote sensing theory, systems, and applications in visible, infrared, and microwave regions of the EM spectrum. The course is divided into three parts. The first part includes science and theoretical basis of remote sensing. The second part of the course involves system characteristics of sensors used in the three regions, including sensor design, calibration, and performance issues. The third part includes student presentations on various applications of remote sensing.

The course is designed for upper division undergraduate students in the College of Engineering who have a strong background in differential/integral calculus, and preferably, in applied physics. It is primarily a lecture-based course with in-class problems, exams, homework assignments, and a project.

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	Medium
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	Medium

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative 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	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Text Recommendations

There is no required text. Handouts will be provided on course website from the following:
(C) Elachi, C., Introduction to the Physics and Techniques of Remote Sensing, John Wiley & Sons, 1987.
(LK) Lilesand and Keifer, Remote Sensing and Image Interpretation, John Wiley & Sons, 2003.
(MRS1) Ulaby, Moore, and Fung, Microwave Remote Sensing: Volume I, Fundamentals and Radiometry, Addison-Wesley, 1981.
(MRS2) Ulaby, Moore, and Fung, Microwave Remote Sensing: Volume II, Active, Addison-Wesley, 1981.
(S) Schott, J., Remote Sensing: The image change approach, Oxford University Press, 1997.
(SE) Schultz and Engman, Remote Sensing in Hydrology and Water Management, Springer, 2000.
(U) Ulaby, F., Fundamentals of Applied Electromagnetics, Prentice Hall, 2006.

All relevant materials and handouts are provided on the Canvas course website:
http://elearning.ufl.edu/

Course Schedule:

PART I: Science and Theory of Remote Sensing: (Weeks 1-6)

1. Introduction
   Electromagnetic (EM) spectrum
   Applications of remote sensing
2. Radiative transfer theory in VI, IR, & Microwave

Exam I

PART II: Sensors in Remote Sensing (Weeks 7-13)

1. Passive sensors used in the Visible, IR, & Microwave regions
2. Active Sensors in Visible/NIR and Microwave regions

PART III: Remote Sensing Applications to Engineering (Weeks 12-15)

Project and student presentations. Examples include applications in environment, ecology, agriculture, hydrology, wireless communication, defense, archaeology, etc

Exam II

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework Sets	20%
In-class assignment	10%
Quizzes (2)	20%
Exam -I	15%
Project *(topic 2%; references 6%; outline 2%; presentation 10%)*	20%
Exam-II	15%
	100%

Grading Policy

$90 \leq A- < 93 \leq A \leq 100$
$80 \leq B- < 83 \leq B < 85 \leq B+ < 90$
$70 \leq C- < 73 \leq C < 75 \leq C+ < 80$
$60 \leq D- < 63 \leq D < 65 \leq D+ < 70$
< 60 E

Academic Policies & Resources
Information on University policies and resources can be found at https://go.ufl.edu/syllabuspolicies.

Class Expectations, and Make up Policy
Classes will be primarily lecture-based, with material presented and discussed in-person. Unless a legitimate reason is provided *prior* to the due date, homework assignments turned in after the due date will count for 50% less than the scored points if turned in *before* the next class past the due date. The assignments turned in after the next class past the due date or after the grades and solutions have been posted will not be graded. An exam or a project for another course *is not a legitimate reason* to miss due dates for this course.

In-class assignments will be completed and discussed during class. The students are expected to turn in their solutions via Canvas course website within 15 minutes following the class period. *No makeup will be offered for missed in-class problems.*

No makeup will be offered for missed quizzes/exams unless agreed upon by the instructor based upon a legitimate reason/documentation provided *prior* to the date of the quiz/exam.

Course Evaluations
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

- The email they receive from GatorEvals,
- Their Canvas course menu under GatorEvals, or

- The central portal at https://my-ufl.bluera.com

Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/ . Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/ .

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu