Instructor:
Name: Tan Wong
Email Address: twong@ufl.edu
Office Phone Number: 352-392-2665
Office Hours: MWF 4:00-5:00pm, NEB 461

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please contact through the Canvas website
  • TBA

Course Description
Digital modulation techniques; analysis of digital communication systems in presence of noise; optimum principles; synchronization; equalization. 3 credit hours.

Course Pre-Requisites / Co-Requisites
EEE 5544 -Noise in Linear Systems

Course Objectives
This course provides an introduction to modern digital communication techniques, including common digital modulation and demodulation techniques, synchronization, equalization, diversity reception, and error control coding. Upon completion of this course, students should be able to:
  i. understand basic principles and techniques of digital communication systems;
  ii. continue further reading, investigation, and research on digital communications.

Materials and Supply Fees
N/A.

Required Textbooks and Software
  • Title: Digital Communications
  • Author: John Proakis and Masoud Salehi
  • ISBN number: 978-0-07-295716-7

Recommended Materials
  • Title: Digital Communication
  • Author: Upamanyu Madhow
  • Publication date and edition: 2008
  • ISBN number: 978-0-521-87414-4

Course Schedule
Week 1: Topic / Lecturer / Corresponding Book Chapters / Quizzes / Exams

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Text Chapter</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, review on random variables and processes</td>
<td>1, 2</td>
</tr>
<tr>
<td>2</td>
<td>Complex baseband and signal space representations</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>M-ary modulations and optimal coherent receiver</td>
<td>3, 4</td>
</tr>
</tbody>
</table>
Performance of coherent modulations
Optimal non-coherent receiver
Performance of non-coherent and differential modulations
Carrier and timing synchronization
Pulse Shaping and Equalization
Pulse Shaping and Equalization
Orthogonal frequency division multiplexing
Fading and diversity reception
Fading and diversity reception
Simple MIMO techniques
Simple MIMO techniques

Attendance Policy, Class Expectations, and Make-Up Policy
Excused absences must be in compliance with university policies in the Graduate Catalog (https://catalog.ufl.edu/graduate/regulations/) and require appropriate documentation.

Evaluation of Grades

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>Percentage of Final Grade</th>
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<tbody>
<tr>
<td>Homework Sets</td>
<td>10 each</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>100</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>100</td>
<td>45%</td>
</tr>
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</table>

100%

Grading Policy

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
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</thead>
<tbody>
<tr>
<td>90.0 - 100.0</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>87.0 - 89.9</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>84.0 - 86.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>81.0 - 83.9</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>78.0 - 80.9</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>75.0 - 79.9</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>72.0 - 74.9</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>69.0 - 71.9</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>66.0 - 68.9</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>63.0 - 65.9</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>60.0 - 62.9</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>0 - 59.9</td>
<td>E</td>
<td>0.00</td>
</tr>
</tbody>
</table>

More information on UF grading policy may be found at: https://catalog.ufl.edu/graduate/regulations/

Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

**University Honesty Policy**

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

**Commitment to a Safe and Inclusive Learning Environment**

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

**Software Use**

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

**Student Privacy**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

**Campus Resources:**
Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: [http://www.counseling.ufl.edu/cwc](http://www.counseling.ufl.edu/cwc), and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or [http://www.police.ufl.edu/](http://www.police.ufl.edu/).

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. [https://lss.at.ufl.edu/help.shtml](https://lss.at.ufl.edu/help.shtml).

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling, [https://www.crc.ufl.edu/](https://www.crc.ufl.edu/).

Library Support, [http://cms.uflib.ufl.edu/ask](http://cms.uflib.ufl.edu/ask). Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. [https://teachingcenter.ufl.edu/](https://teachingcenter.ufl.edu/).

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. [https://writing.ufl.edu/writing-studio/](https://writing.ufl.edu/writing-studio/).

Student Complaints Campus: [https://care.dso.ufl.edu](https://care.dso.ufl.edu).