

Data Measurement and Analysis

EGM 5121C

Class Periods: T 7 (1:55 - 2:45 p.m.) / R 7-8 (1:55 - 2:45 p.m. , 3:00 - 3:50 p.m.)

Location: CSE E122

Academic Term: Fall 2019

Instructor:

Mark Sheplak

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215 Larsen Hall

352-392-3983

Office Hours: T: 12:30-1:30 p.m., W: 1:00-2:00 p.m., other time via appointment

Teaching Assistant/Peer Mentor/Supervised Teaching Student: n/a

Course Description

Tools for random data analysis (including types of random data, mean values, mean-square values, probability density and distribution functions, moments and characteristic functions, and spectral and correlation analysis); bias and random error estimates in data measurements; input-output system models; and measurement examples.

Course Pre-Requisites / Co-Requisites: n/a

Course Objectives

The objective of this course is to explore the application of time- and frequency-domain methods to time series data. The course builds upon the fundamental principles introduced in statistics and numerical & experimental methods and is intended primarily for graduate students interested in data analyses. The course emphasizes the understanding, application, and interpretation of various methods. Statistical functions (e.g., probability density functions, moments, etc.), time-domain (e.g., auto- and cross-correlation) functions, and frequency-domain (e.g., auto- and cross-spectra) methods are derived and applied to practical engineering problems. The application of the methods presented in the course will be illustrated via homework problems that utilize MATLAB. Exams will also be used to reinforce important aspects of the methods. Finally, a project will apply a specific analysis to engineering data applicable to the student's research topic.

Materials and Supply Fees: n/a

Required Textbooks and Software

- **Required Text:** Random Data: Analysis and Measurement Procedures, Fourth Edition, by J. S. Bendat and A. G. Piersol, Wiley Interscience, 2011.
- **Recommended Text:** Engineering Applications of Correlation and Spectral Analysis, Second Edition, by J. S. Bendat and A. G. Piersol, Wiley Interscience, 2013.
- **Student version or standard version of Matlab (required)**

Attendance Policy, Class Expectations, and Make-Up Policy

It is expected that this course will require at least 12-15 hours of effort per week when you consider time spent for lectures, reading assignments, homework, and re-writing of your class notes. I also expect that you will attend every lecture. If you cannot attend a lecture, please notify me prior to class. I strongly recommend that you implement the "Five Times Strategy" for learning in this class. This requires that you cover the course material at least 5 times before exams. The first time that you cover the material is when you perform your reading assignment before class. The second time that you cover the material is during lecture. The third time that you cover the material is when you re-write your "lecture set" of notes that includes material from lecture and the reading assignments, including all derivations and your additions. The fourth time that you cover the material is when you do your homework assignments. Finally, the fifth time that you cover the material is when you study for

your exams. This technique will help you master the material and also will provide you with a comprehensive set of notes to potentially teach from one day.

The course will be taught from a Tablet PC using our typeset notes, which will be posted on the website. These notes are meant to accompany the assigned readings from the text and reference books. **They are not to be considered substitutes.** You will be responsible for both the material covered in class and the assigned readings.

You are expected to show up on time for class. Please turn off all cell phones prior to the start of class. You are permitted to have a laptop, tablet etc. to take notes with. If you are a distraction in class, you will be asked to leave. Please do not bring food to class.

Re-grading Policy: Any re-grade requests must be submitted in writing within one week after return of the graded paper. The written request must explain in detail what you want the grader to do and where you believe he/she has made a mistake in grading. The request must have a date on the top of the page, your name, your telephone number(s), and e-mail address.

Miscellaneous Policies: Students will be held responsible for knowledge of all scheduling and policy announcements made in class. If you send an email please do this via Canvas and also list a phone number where you could be reached. Please use the discussion feature of Canvas as much as possible.

Make-up Exam/HW Policy: There are no make-up exams and there are no-make up HWs. I am already dropping the low regular exam score. A missed exam will count as your dropped exam. If you have a valid excused absence, I will not hold the missed HW against you. I will just grade you based on the other HWs.

Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets	100 each	25%
Exam 1 (9/24/19)	100	25%
Exam 2 (10/29/19)	100	25%
Exam 3 (12/11/19)	100	25%
Final Project	100	25%
(low exam dropped)		100%

Grading Policy

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

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

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 feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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>, 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/>.

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>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <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/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.