

EMA 3800 – Error Analyses and Optimization of Experiments

EMA 3800 Section 5307

Class Periods: M,W,F, Period 3, 8:30- 9:20

Location: FLG 280

Academic Term: Spring 2020

Instructor:

Prof. G. Bahar Basim

gbbasim@ufl.edu

352-846-3557

Office Hours: Monday, 10:00-12:00 (Tentative)

Particle Science and Technology Building

1180 Center Drive

205 C

"I will always try to respond to e-mail questions as fast as possible. Important e-mail questions (minus identifying information) and answers will be posted to the class either by e-mail or on the course website for the benefit of other students. Please make sure to copy your TA in your e-mail inquiries."

Teaching Assistants:

Please contact through the Canvas website

- Chaitanya Bhavne chaitanya.bhavne@ufl.edu

Office Hours: TBD

Course Description

Statistical approach for materials research, basic and relevant statistical concepts, error analyses, factorial matrices, reducing the variance, nested designs and sampling plans, mixture designs, optimization technology, response surface methods, Taguchi and Statistical Process Control (SPC).

Course Pre-Requisites / Co-Requisites

EMA 3010

Course Objectives

Students will develop fluency with multiple methods of statistical analysis and experimental design and learn how the material will be relevant in their careers through the integration of unique problem sets that reflect realistic applications and situations from research.

Materials and Supply Fees

WileyPlus Book and resources

Professional Component (ABET):

State the contribution of the course to meeting the professional components of the ABET-accredited degree.

Relation to Program Outcomes (ABET):

The table below is an example. Please consult with your department's ABET coordinator when filling this out.

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

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	High
3. an ability to communicate effectively with a range of audiences	Low
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	
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive 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.	

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

Required Textbooks and Software

- Title : Applied Statistics and Probability for Engineers, 7th Edition
- Author : Douglass C. Montgomery, George C. Runger
- Publication date and edition : January 2018, 7th edition, E-book
- ISBN number : 978111940036-3

Course Schedule

Tentative Course and Lecture Outline

Week	Class dates	Topic	Chapter
1	January 6	Course Objectives, Syllabus, Introduction	0
	January 8	The Role of Statistics in Engineering	1
	January 10	Probability	2
2	January 13	Probability	2
	January 15	Probability	2
	January 17	Discrete Random Variables and Probability Distributions	3
3	January 20	Martin Luther King, Jr.'s Birthday	
	January 22	Discrete Random Variables and Probability Distributions	3
	January 24		
4	January 27	Case Study_ I	1-3
	January 29	Review	1-3
	January 31	In Class Midterm Exam 1	1-3

Week	Class dates	Topic	Chapter
5	February 3	Continuous Random Variables and Probability Distributions	4
	February 5		
	February 7		
6	February 10	Joint Probability Distributions	5
	February 12		
	February 14		
7	February 17	Descriptive Statistics	6
	February 19		
	February 21		
8	February 24	Case Study_ II	4-6
	February 26	Review	4-6
	February 28	In Class Midterm Exam 2	4-6
9	March 2	Spring Break	
	March 4		
	March 6		
10	March 9	Point Estimation of Parameters and Sampling Distributions	7
	March 11	Point Estimation of Parameters and Sampling Distributions/ Statistical Intervals for a Single Sample	7/8
	March 13	Statistical Intervals for a Single Sample	8
11	March 16	Statistical Intervals for a Single Sample	8
	March 18	Test Hypothesis for a Single Sample	9
	March 20		
12	March 23	Case Study_ III	7-9
	March 25	Review	7-9
	March 27	In Class Midterm Exam 3	7-9
13	March 30	Single Linear Regression	11
	April 1		
	April 3		
14	April 6	Design and Analysis of Single Factor Experiments	13
	April 8		
	April 10		

Week	Class dates	Topic	Chapter
15	April 13	Statistical Process Control	15
	April 15		
	April 17	Review	11,13,15
16	April 20	Case Study_ IV	11,13,15
	April 22	Review/Make-up Exam	

Attendance Policy, Class Expectations, and Make-Up Policy

Lectures

Lectures are critical to success in this MSE course. Your attendance to the classes is encouraged.

Attendance

Attendance is not required but highly encouraged since there will be In Class Exercises (ICE). Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required based on the ICE discussions and exam results as needed.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Homework

Homework exercises from the end of each chapter will be assigned. These homework questions are essential to your study and some exam questions will be adapted from them. There will be ~8-10 homework assignments throughout the semester, and the lowest 2 will be dropped from the final score. Each homework assignment is weighted equally, and the homework will account for **15%** of your grade. Homework will be posted, submitted, and graded through the Canvas/WileyPLUS web site via e-learning. **No late homework assignments will be accepted.** You will be allowed 1 or more re-submission attempts for each homework, but this must be done before the homework due date/time.

Please see your TA during office hours to discuss homework problems.

Exams

There will be 3 Midterm exams and a final throughout the semester. The exam content may change, and the dates are tentative and will be finalized after the add/drop period. Each exam is weighted equally, and each exam will be worth 22.5% of your final grade. The lowest exam score will be dropped. There is a comprehensive final exam that is worth 25% of your grade. Review sessions will be given prior to each exam. The tentative exam dates are as follows;

Midterm Exam 1	: Friday, January 31, 2020
Midterm Exam 2	: Friday, February 28, 2019
Midterm Exam 3	: Friday, March 27, 2019
Make-Up Exam	: Wednesday, April 22, 2020
Final Exam	: TBD

You have two weeks after the test results are posted to resolve any questions about scores and grades. No changes to your exam grade will be made after that time.

Chapters on each exam:

- Exam 1: Chapters 1, 2, 3
- Exam 2: Chapters 4, 5, 6
- Exam 3: Chapters 7, 8, 9
- Final : Comprehensive with Chapters 11, 13, 15 (75 %)

Exam Conflicts with other course exams

The official UF policy on exam conflict resolution states that when two exams conflict, the course with the higher number will take priority. There will be no exceptions to this rule.

Make-up exams

Students who do not take an exam will receive a grade of 0. There will be a make-up exam for a missed exam that is going to be given the last day of classes depending on student's request based on the minimum exam grade drop policy.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

All the Make-up exams will be scheduled by the course instructors.

Bonus points

There may be some bonus point activities that will be assigned during the class hours. Bonus points may also be added to the midterm exams.

Case Studies and Reports

There will be 4 case studies covered during the class hours. Students will work individually to write reports on the case study covered during the class. There may also be additional reports assigned to be graded or as a bonus point.

In Class Exercises (ICE)

There will be multiple "in class" exercises during the class hours. Students will be allowed to work in small groups or work individually depending on the type of given assignment. In Class Exercises are graded or assigned as bonus points as an indicator of class participation. There is no make up for the ICE and you have to be present in the class to complete them. There will be multiple bonus ICEs that can be accounted for your excused absences.

Rules for the Midterm Exams

- All cell phones must be turned off and they cannot be used in place of a calculator.
- 1 letter size paper can be used as a formula sheet for the exams that has to be handwritten. No photocopies or print outs are allowed.
- You are responsible to know all the functions of your calculators
- Show all your work as needed
- Any suspicious activity during exam will result in marking of your exam paper to be evaluated accordingly.

Behavior in class

- No behavior that can distract the other students in class will be allowed.
- Jean-Jacques Rousseau Principle “Ones freedom ends where the others freedom starts.”
- Destructive behavior will result in your dismissal from the class.

Record keeping

All materials from this class that students will be saved for a year and will be shredded afterwards.

Syllabus Changes

I reserve the right to make changes in the syllabus as needed. Any changes will be clearly announced on canvas and in class.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (10)	100 each	15%
Case Studies & Reports (6-8)	100 each	10%
ICE (TBD)	100 each	5%
Midterm Exams (2)	100 each	45%
Final Exam (1)	100 each	25%
		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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>.