MST570 Design of Experiments
Class material will be posted on Angel

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Textbooks:

- Design and Analysis of Experiments, 8th edition, by D.C. Montgomery, Wiley & Sons, NY, 2013.

Any supplemental course material will be posted on Angel.

Communication: Check Angel frequently, i.e., daily. In the event I must communicate urgently to the class then I will send and email in addition to posting an announcement.

Grading Scheme:

Term Project:	25	Exams (2 exams):	50	Final Exam:	25
Total:	**100**				

Exams: Each exam during the regular semester is worth 25 points. The final exam is comprehensive and is worth 25 points. All exams will be take-home tests.

Term project: The term project can be performed in teams of up to three students. The project requires the appropriate use of design of experiments principles to plan, design, conduct, and analyze an experiment. Two written interim reports and a final project report are required. See the syllabus for the deadlines. The project can be directly connected to your own research project. Alternatively, it can be related to another type of experiment that you can perform. You must clear the idea of your project with me first, otherwise, your project reports will not be accepted.

Computer use: It is the formal policy of this class that computers are necessary. This includes access to and the use of the Internet. Additional requirements are the use of Matlab.

Other behavior expectations: Students are expected to take a sincere interest in learning the classroom material and to abide by the university policies. Keeping with this expectation, students should: 1) read the assigned material and do the assigned work on time, 2) be courteous to other students and the instructor. This includes using proper and efficient email communications. Violations of the university policies will be dealt with appropriately and may involve the Academic Conduct Board.

Course Help: Good study habits are absolutely essential to your success in this course. If you feel you are having difficulty keeping up with work, please contact me as soon as possible so we can figure out a plan to get you and your study habits back on track.

Course description: This is a basic course in designing experiments and analyzing the resulting data. it is intended for engineers, physical/chemical scientists and scientist from other fields such as biotechnology and biology. The course deals with the types of experiments that are frequently encountered in industrial settings.

Course objectives: By the end of this course, the students are expected to:

- Plan, design, and conduct experiments efficiently and effectively
- Analyze the experimental data to reach objective conclusions
- Design, improve, and develop new products
- List example of the wide applications for design of experiments in various fields of science and engineering
- Implement the methods used in this class using Matlab

Course subject outline:

1. Introduction to design of experiments
2. Analysis of Variance (ANOVA)
3. Practical aspects of planning experiments
4. Randomized complete block design (RCBD)
5. Factorial and fractional factorial designs
6. Response surface methods
7. Mixed models
8. Nested designs
9. Split-plot designs

Academic Integrity

Under no circumstances may you submit another person's work for credit. For the products of a team work (e.g. a design project), all team members should submit their work together. SUNYIT's current Code of Academic Conduct regarding plagiarism and other inappropriate academic activities are in the Student Handbook (Page 49-53, available at http://www.sunyit.edu/pdf/student_handbook.pdf).

Social Justice Statement

SUNYIT is committed to social justice. I concur with the commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. SUNYIT does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sex orientation, color, or national origin. Any suggestions on how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are in need of accommodations due to a documented disability, please see me as soon as possible. I will need a copy of your current accommodations plan. If you do not have a current plan, please contact Suzanne Sprague (suzanne.spraguesunyit.edu) in the Disability Services Office located in the Career Services Suite, B104, Kunsela Hall, 315-792-7170, to develop an accommodations plan. This plan must be updated each semester.

In compliance with the Americans with Disabilities Act of 1990 and with Section 504 of the Rehabilitation Act, SUNYIT is committed to ensuring educational access and accommodations for all its registered students, in order to fully participate in programs and course activities or to meet course requirements. SUNYIT's students with documented disabilities and medical conditions are encouraged to access these services by registering with the Disability Services Office (Kunsela Hall, B105)and to discuss their particular needs for accommodations. For information or an appointment, contact Suzanne Sprague at 792-7170 or email suzanne.sprague@sunyit.edu.

Lecture Schedule

Week	Date	Topics	Reading
		Design of Experiments	
1	1/21	Introduction	Chapter 1
		Review of basic statistics I	2.1–2.3
	1/23	Review of basic statistics II	2.4
		t-test and confidence intervals	
2	1/28	Introduction to the Analysis of Variance (ANOVA)	3.1–3.3
	1/30	Practical aspects of planning experiments	
3	2/4	ANOVA; multiple comparisons	3.4–3.6
		Residual and model adequacy checking	
	2/6	ANOVA; checking model assumptions	15.1.1
		The Box-Cox method	
4	2/11	Choice of sample size in designed experiments	3.7,3.8
		Dispersion versus location effects	
	2/13	The randomized complete block design (RCBD)	4.1
5	2/18	RCBDs, Latin squares, and related designs	4.2
	2/20	Factorial designs I	5.1–5.3
6	2/25	Factorial designs II	5.4-5.6
		First project report due	
	2/27	2^k factorial designs I	6.1–6.3
		Exam 1	
7	3/4	2^k factorial designs II	6.4–6.6
	3/6	2^k factorial designs III	6.7–6.9
8	3/11	**Spring break**	
	3/13	**Spring break**	
9	3/18	Blocking & confounding in the 2^k designs I	7.1–7.3
	3/20	Blocking & confounding in the 2^k designs II	7.4–7.6
10	3/25	2^{k-p} fractional factorial designs I	8.1,8.2
	3/27	2^{k-p} fractional factorial designs II	8.3
		Second project report due	
11	4/1	2^{k-p} fractional factorial designs III	8.4,8.5
	4/3	2^{k-p} fractional factorial designs IV	8.6
		Exam 2	
12	4/8	2^{k-p} fractional factorial designs V	8.7
	4/10	2^{k-p} fractional factorial designs VI	8.8
13	4/15	Response surface methods	11.1–11.3
	4/17	Random factors in experiments	13.1
14	4/22	Random factors in factorial experiments, mixed models I	13.2, 13.3
	4/24	Random factors in factorial experiments, mixed models II	13.5, 13.6
15	4/29	Nested design	14.1–14.3
	5/1	Split-plot designs	14.4
		Term projects due	