Math 385-01   Syllabus   Spring Semester 2019

COURSE: Introduction to Mathematical Modeling
TuTh 1:00pm-2:15pm in Janet & Walter Sondheim Building #205

PROFESSOR: Hye-Won Kang
Office: Math/Psych Building #424
Email: hwkang@umbc.edu
Office Hours: Tuesday and Thursday during 11:00am-12:00pm, or by appointment.
I will try to respond to all emails on the same day. However during the weekends, I am
not available to answer them.

GRADER: Taylor Alexander

TEXT: A First Course in Mathematical Modeling, by Giordano, Fox, Horton, and Weir; Fourth
Edition, Brooks/Cole, Cengage Learning. Textbook is recommended to purchase but
not required. I will provide all homework problems in Blackboard.

COURSE DESCRIPTION:

This course is intended to help students establish mathematical reasoning and skills
in mathematical modeling for various practical problems arising from many academic
disciplines, including the mathematical sciences, economics, business management, op-
erations research and life sciences. We will cover most of Chapters 2, 3, 6, 7, 11, 12 of
the textbook.

PREREQUISITE:

You must have completed MATH 225 or MATH 355 with a grade of "C" or better.

GRADING POLICY:

Grades are based on homework, two midterm exams, a final exam, and a final group
project (project report and presentation). Your two lowest homework scores will be
dropped. Final letter grade is decided based on the total grade as follows:

Letter Grade	Total Scores
A	$90 \leq \text{Total} \leq 100$
B	$80 \leq \text{Total} < 90$
C	$70 \leq \text{Total} < 80$
D	$60 \leq \text{Total} < 70$
F	$\text{Total} < 60$

However, factors such as overall distributions of grades or consistency in homework and
midterm exams will affect on the final letter grade. Contributed portions of the total
score are as follows:

	HOMEWORK	MIDTERM EXAMS	FINAL EXAM	FINAL PROJECT	TOTAL
Percentage	20%	40%	20%	20%	100%

HOMEWORK:

There will be weekly assignments and it is due every Tuesday. You are required to turn in your homework to me before the class, which are assigned in the materials learned on Tuesday and Thursday a week before. All problems in every homework will be graded. You are encouraged to discuss together but copying from other students is NOT allowed. Also, copying from a solution manual is PROHIBITED. Any violation will result in ZERO grade and will be reported to the University Academic Integrity Committee. Your two lowest homework scores will be dropped. Late homework or submission by email will NOT be accepted.

MIDTERM EXAM:

Two midterm exams will be taken in class (February 26 and April 4). Chapters for the midterm are given in the schedule of the course. You are NOT allowed to bring any cheat sheet and you are allowed to bring a scientific calculator during the exam. Graphical calculators are PROHIBITED.

FINAL EXAM AND PROJECT:

All Math 385 students are required to take a final exam covering the topics listed on this syllabus and a final project. The final exam will be taken during 1:00pm-3:00pm on May 21 and the final group project report is due by May 24. The final group project report should be submitted ELECTRONICALLY ONLY. You can write the project by hand or type them using MS Word or other software. In case you write them by hand, they should be LEGIBLE.

SCHEDULE OF EXAMS:

Exam 1: February 26, 2019 during the lecture
Exam 2: April 4, 2019 during the lecture
Project Presentation: May 2-9, 2019 during the lecture
Final Exam: May 21, 2019 1:00pm-3:00pm in the lecture room
Project Report: All material should be submitted electronically due by May 24, 2019.

MAKE UP EXAM AND MISSED EXAM POLICY:

In very emergency case only, you can ask for a make-up exam. You must notice to the instructor at least 10 days before the original exam date. Make-up exams will be taken before the original exam date (for midterm). In case, you do not notice for a make-up exam and missed it, there will be no make-up exam AT ANY CASE. If you miss one of the midterm exam, final exam, or final project, I do not think you can pass the course.

ATTENDANCE:

The attendance is not mandatory except for project preparation and presentation days, but is highly recommended. Based on the previous experience, students who attend every lecture have a very higher tendency to get a higher score at the end. When you come to the class, you are expected to participate in the class. I ask that you bring a textbook, you are on time, and pay attention to the class. No excuse for being habitually late and the use of smartphones during class is strongly discouraged. Please do not distract yourselves and other students.

CALCULATOR:

During exams, you can only use a scientific calculator. You need to explain every part based on the mathematical reasoning.

INCOMPLETE:

If you do complete the course successfully except for a very small portion or a final exam due to very extraordinary and emergence situation (such as to stop attending school for the rest of the semester due to injury in an accident), you will be considered to get Incomplete. You are required to submit a written statement and evidence describing reason to get Incomplete. If the reason to get Incomplete is because you are behind in the course, I would recommend to drop the course, instead.

GETTING HELP:

There are lots of places you can get help. Tutoring is available through the Learning Resources Center (https://lrc.umbc.edu) and for athletes, the Athletic Department.

ACADEMIC INTEGRITY:

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of disciplinary action that may include, but is not limited to, suspension or dismissal. See the Faculty Handbook, or the UMBC Policies section of the UMBC directory (https://aetp.umbc.edu/ai/).

APPROXIMATE COURSE SCHEDULE:

This course will cover various topics. The below is the approximate schedule of the course which is subject to change. The changed schedule will be updated regularly on the course web page in Blackboard.

WEEK	DATES	SECTIONS	TOPICS
1	Tu Jan 29	2.1	Mathematical Model
		2.2	Modeling Using Proportionality
	Th Jan 31	2.3	Modeling Using Geometric Similarity
2	Tu Feb 5	2.4	Automobile Gasoline Mileage
		HW1 due	From Sections 2.1, 2.2, and 2.3
	Th Feb 7	3.1	Fitting Models to Data Graphically

Friday, February 8, is the last day to withdraw from the course <u>without</u> receiving a 'W' on your transcript.

WEEK	DATES	SECTIONS	TOPICS
3	Tu Feb 12	3.3-I	Applying the Least-Squares Criterion
		HW2 due	From Sections 2.4 and 3.1
	Th Feb 14	3.3-II	Applying the Least-Squares Criterion (cont.)
4	Tu Feb 19	6.1-I	Probabilistic Modeling with Discrete Systems
		HW3 due	From Section 3.3
	Th Feb 21	**Review 1**	**Review for Exam 1**
5	Tu Feb 26	**EXAM 1**	**Sections 2.2-2.4, 3.1, and 3.3**
	Th Feb 28	6.1-II	Probabilistic Modeling with Discrete Systems (cont.)

WEEK	DATES	SECTIONS	TOPICS
6	Tu Mar 5	6.3	Linear Regression
		HW4 due	From Section 6.1
	Th Mar 7	7.1	An Overview of Optimization Modeling
7	Tu Mar 12	7.2	Linear Programming I: Geometric Solutions
		7.3	Linear Programming II: Algebraic Solutions
		HW5 due	From Sections 6.3 and 7.1
	Th Mar 14	Project	Discuss possible project topics
8	Tu Mar 19	Spring Break	No class
	Th Mar 21	Spring Break	No class
9	Tu Mar 26	7.4	Linear Programming III: The Simplex Method
		HW6 due	From Sections 7.2 and 7.3
	Th Mar 28	7.6	Numerical Search Methods
10	Tu Apr 2	**Review 2**	**Review for Exam 2**
		HW7 due	From Sections 7.4 and 7.6
	Th Apr 4	**EXAM 2**	**Sections 6.1, 6.3, 7.1-7.4, 7.6**

Monday, April 8, is the last day to withdraw from the course <u>with</u> receiving a 'W' on your transcript.

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WEEK	DATES	SECTIONS	TOPICS
11	Tu Apr 9	11.1	Population Growth (No class, see the online lecture)
	Th Apr 11	11.4	Graphical Solutions of Autonomous Differential Equations
12	Tu Apr 16	12.1	Graphical Solution of Autonomous Systems of First-Order Differential Equation
		HW8 due	From Sections 11.1 and 11.4
	Th Apr 18	12.2	A Competitive Hunter Model
13	Tu Apr 23	12.3	A Predator-Prey Model
		HW9 due	From Sections 12.1 and 12.2
	Th Apr 25	Project	**Project Preparation (Group meeting)**
14	Tu Apr 30	Project	**Project Preparation (Group meeting)**
		HW10 due	From Section 12.3
	Th May 2	Project	Project Presentation
15	Tu May 7	Project	Project Presentation
	Th May 9	Project	Project Presentation
16	Tu May 14	**Review 3**	**Review for Final Exam**
	Th May 16		No class
17	**Tu May 21**	**Final Exam**	**Sections 11.1, 11.4, and 12.1-12.3**
	Fri May 24	**Final Project**	**Final project report due date, submit electronic copy only by email**