ECON 501: QUANTITATIVE METHODS FOR ECONOMISTS
FALL 2018
Room C213 Clark, 08:00-09:15 TR, and 08:00-08:50 W

ALERT: This class is officially scheduled for 08:00-09:15 TR for the full semester, but due to required work travel by the professor, will also meet 08:00-08:50 W most weeks in order to generate the necessary class time. See the calendar on page 3.

Professor:
Bob Kling, C 305 Clark, email *Robert.Kling@ColoState.edu*
Office Hours: 9:30-10:30 TR and 9:00-9:30 W on class meeting days, or by appointment at other times

Grading Assistant
Belle Berklund, C 309C Clark, email *Annabelle.Berklund@gmail.com*
Office Hours: 3:00-4:00 W, 11:00-1:00 F, or by appointment at other times.

COURSE OBJECTIVES

This course presents mathematical methods that are essential for graduate students in economics and related fields to be able to successfully master the theory courses in microeconomics, macroeconomics, and econometrics. It presumes a first course in calculus (including optimization of functions of one variable) and other general math competency. It covers essential material in matrix algebra, set topology, multivariable calculus, unconstrained and constrained optimization, and ordinary differential equations. By the end of this course, you should be able to:

- → define and understand a broad menu of math concepts relevant to economic analysis,
- → solve a variety of math problems common in economic modeling,
- → work with numerous applications of mathematical methods in economics,
- → independently determine appropriate math methods to apply to economic modeling problems that may arise.

To these ends, the course will include:

- presentation of key quantitative methods via classroom lecture and a formal textbook,
- plenty of examples of how math methods are usefully applied to economic questions,
- problem sets to give you an opportunity to exercise your analytical abilities,
- exams to demonstrate your development in a formal structure.

RESOURCES

Textbook: Simon & Blume, *Mathematics for Economists* (Norton, 1994)

Math Camp: Math Camp involves six 2-hour sessions during the week before classes start, and is intended to support 1st-year graduate students in Economics, in Agricultural & Resource Economics, and in related disciplines, in being ready to successfully pursue ECON 501 (Quantitative Methods for Economists) and other mathematically oriented graduate courses. Math Camp is very strongly recommended for all entering students with the exception of individuals who have especially strong recent math training. Math Camp is required for all students funded by the Department of Agricultural and Resource Economics. Information is available from the Department of Economics.

Canvas: Canvas is the online course platform used at Colorado State University. All course materials, including this syllabus, course content outline, homework assignments, etc., will be provided through Canvas.

COURSE SCHEDULE

A detailed calendar appears on the following page.

Textbook: Simon & Blume, *Mathematics for Economists* (Norton, 1994)

Weeks	Lecture Topics	Readings in Simon & Blume	Tentative Test Dates
1-2	**Linear Algebra**		
	A. Systems of linear equations	Chs 6 and 7	
	B. Matrix algebra and determinants	Chs 8, 9, and 26	
3-4	**Spaces and Sets**		
	C. Points, vectors, lines, and planes	Chs 10 and 11	
	D. Characterizing sets in real space	Ch 12	
4-6	**Multivariable calculus**		***Test 1: Tue 25 Sep (Topics ABCD)***
	E. Functions of several variables	Ch 13	
	F. Calculus of several variables	Chs 14 and 15	
6-11	**Optimization**		
	G. Quadratic forms and definite matrices	Ch 16	
	H. Unconstrained optimization	Ch 17	***Test 2: Tue 23 Oct (Topics EFGH)***
	I. Constrained optimization	Chs 18 and 19	
	J. Characterizing functions	Chs 20 and 21	
14-15	**Additional topics as time allows**		
	K. Duality	Ch 22 secs 22.1 - 22.2	
	L. Risk and Return	Ch 30 sec 30.2	
	M. Ordinary differential equations	Ch 24	
16	*Final exam week*		***Test 3: Mon 10 Dec 2:00pm (IJKLM)***

Summary of Key Dates (subject to change):

Tentative Test Dates	Anticipated HW Schedule:
	HW 1: out T 21 Aug, due T 28 Aug
Test 1: Tue 25 Sep, Topics ABCD	HW 2: out R 30 Aug, due R 6 Sep
	HW 3: out W 12 Sep, due W 19 Sep
Test 2: Tue 23 Oct, Topics EFGH	HW 4: out R 20 Sep, due T 2 Oct
	HW 5: out T 2 Oct, due T 9 Oct
Test 3: Mon 10 Dec, Topics IJKLM	HW 6: out T 9 Oct, due W 17 Oct
	HW 7: out R 1 Nov, due M 27 Nov
	HW 8: out R 29 Nov, due R 6 Dec

Students should alert the professor to test schedule conflict issues with other courses in the Economics and Agricultural & Resource Economics programs, in case adjustments can and should be made.

ECON 501: TENTATIVE CALENDAR, FALL 2017

Tuesdays and Thursdays, 08:00 – 09:15

Wednesdays, 08:00 – 08:50

Tuesday	Wednesday	Thursday
AUGUST		
21 A *HW1 out*	22	23 B
28 B *HW1 due*	29 B	30 C *HW2 out*
SEPTEMBER		
4 C	5 C	6 C *HW2 due*
11 D	12 E *HW3 out*	13 E
18 E	19 F *HW3 due*	20 F *HW4 out*
25 **TEST #1** **on ABCD**	26 F	27 G
OCTOBER		
2 G *HW4 due* *HW5 out*	3 H	4 H
9 I *HW5 due* *HW6 out*	10 I	11
16	17 I *HW6 due*	18 I
23 **TEST #2** **on EFGH**	24	25 J
30 J	31	**NOVEMBER** 1 J *HW7 out*
6	7	8
13	14	15
THANKSGIVING BREAK		
27 K *HW 7 due*	28 L	29 L *HW 8 out*
DECEMBER		
4 M	5 M	6 *No class but:* *HW 8 due*
Test #3 on IJKLM – Monday the 10th , 2:00-4:00pm		

GRADES

Course grades will be based on the following:

Tests: (3 exams) x (20 percent each) = 60 percent

- Each test, including Test 3, is a unit test which will focus on the material for that part of the course, and will be comprehensive only to the degree that the current topics naturally use earlier topics as foundational material.
- A detailed topic outline will be provided for each test.
- Tests will involve a mix of short answer (e.g., definitions or examples) and long answer questions.

Problem sets: (8 problem sets) x (5 percent each) = 40 percent

- Problem sets will be scored on a 5-point basis as follows:
  - 5 = Thorough, diligent, and mostly correct
  - 4 = Thorough and diligent, with mistakes but overall display of understanding
  - 3 = Thorough and/or diligent, but with important misunderstandings
  - 2 = Pervasive misunderstandings and/or major omissions
  - 1 = Minimal or no effort
- Collaborations on problem sets is allowed, but pure copying certainly is not. The answers you submit must be your own presentation, and must reflect an understanding you have established in your own head, even if the understanding is based on collaboration with colleagues. *If you work with a colleagues, please make a note on each homework paper about whom you worked with.*

Overall grading scale: Your letter grade for the course is expected to be determined according to the following scale:

96 – 100%	A+	83 – 86%	B+	60 – 69%	C
90 – 95%	A	76 – 82%	B	50 – 59%	D
87 – 89%	A-	70 - 75%	B-	0 – 49%	F

Academic Integrity: This course will be administered consistent with the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. Student conduct must adhere to the policy, and so will instructor response to any incidents that arise. You must make yourself familiar with the policies. See http://tilt.colostate.edu/integrity/ .

MISCELLANEOUS POLICIES

Politeness:

University regulations require this syllabus to ask you to be polite in class. We hope this is unnecessary to mention in a graduate course, but it does imply that you avoid arriving late to class.

Alternative Testing:

Students requiring alternative testing conditions should seek evaluation and certification with the Student Disability Center.

Early exams and make-up exams:

Early and late exams are given only for cases of documented exceptional need.