



Quantitative Methods for Economics & Business

ECON 205/BUSI 205

Credit hours: 3

Grading: A/B/C/D/F

Class meeting time(s): MWF 10:00 - 10:50

Prerequisite Course(s): MATH 105 or the equivalent; proper placement by the Bethany College Mathematics Placement Examination; or permission.

LAC/Gen Ed designation: None

Revisions due to COVID-19 are in blue.

Economists were invented to make weather forecasters look accurate.

Instructor(s): Wilfrid W. Csaplar Jr., Ph.D.
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Office Location: Richardson 022
Office Hours: TBA via Zoom
Contact me if you want to see me at other times.

I. Rationale: This course gives you the mathematical tools which are used in economics and business courses.

II. Course Description: *Quantitative Methods for Business and Economics* teaches the mathematical tools from *Calculus* and *Linear Algebra* which are used in Economics and Business. Topics include derivatives, multi-variate derivatives, and systems of equations applied to problems from Economics and Business.

IIIA. Student Learning Outcomes: Students will be able to find maximizations using calculus and be able to solve systems of equations using linear algebra.

IIIB. Topics: Students will be able to understand the dimensions of economic variables; know what functions are and how to plot linear, quadratic, exponential and log functions; recognize concavity and convexity on a graph; know what a sequence is and what is meant by its limit; be able to do present value calculations using a series; know what is meant by marginal analysis and how it applies to both mathematics and

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economics; know what a tangent line is and why it is important; know when a function is differentiable; differentiate simple functions like polynomials, natural logs, and exponential; understand how and why derivatives relate to total and marginal functions like TPL, TR, TC, MPL, MR, and MC etc.; understand the graph, calculus, and the economics as to why the MR curve for a straight line demand bisects the angle formed with the price axis; why the marginal curves must cross the max or min of average curves (for example MC and ATC); be able to find elasticities using derivatives and understand what they mean; be able to take the second and third derivatives and understand their meanings; use the third derivatives to find concavity and convexity of a function; find unconstrained maxima and minima for equations of one variable using first order and second order conditions; know the difference between global maximum, local maximum, and inflection points; Know how elasticity relates to revenue; solve a system of linear equations using row operations and by using matrices and apply them to economic models; operate on a matrix until it is in reduced row-echelon form; perform simple operations on matrices, like determining when they are equal and addition, subtraction, transpose, etc.; finding the inverse and determinants for 2x2 and 3x3 matrices and using them to solve models like multiple inter-related markets; use Cramer's Rule for nxn matrices where $n > 3$ to solve systems of equations like the Leontief Input-Output Model; and be able to take partial derivatives and second order partial derivatives. You would have to find the gradients; and totally differentiate an equation and use that to find slopes of graphs like indifference curves and isoquants.

IV. Format and Procedures: This course will consist of predominately modified lecture format. What I mean by that, is that I will ask questions and we will figure out the material as we go. There will be weekly homework assignments except for weeks when you take a test. We will review the tests when they are handed back. During these reviews, volunteers will go to the board to give their answers to the questions. The same format will be used to review the tests when they are handed back. The final will be a comprehensive exam. (See old tests on my web page for examples.)

V. My Assumptions: This course has pre-requisite of MATH 105. I assume that you will attend all classes and do all of the work. See the class participation grade description for more details.

VI. Course Requirements:

(A) Class attendance and participation policy: Because of the class participation grade, it is expected that you will attend all classes and actively participate. That means you will answer questions that I ask, or that other students ask, and you will ask

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questions when you are uncertain about something. If you miss a large number of classes, then you will have a poor participation grade, and more important, you will not have heard the material. Not hearing the material will hurt your grade more than the lower participation grade (see grading rubric below). Not participating, showing up late, or leaving early will lower your participation grade. A valid reason for missing class, as explained in *Late Work Policy* below, will not hurt your participation grade.

(B) Late Work Policy: If you miss an assignment or test because of an unanticipated event like an illness, you have two choices. The first is to get me an *Explanation of Absence Form* signed by the appropriate person, or you can tell me what the problem was and I will decide whether or not it is a valid reason for missing the assignment. **You do NOT have to tell me why you are absent, but if you want more time than the *Explanation of Absence Form* provides, you can tell me your reason and I will decide the reasonableness of your request.** If you know beforehand that you will be missing an exam and have a valid reason to do so, then contact me beforehand to determine how it will be made up. I may ask for external verification of your reason, so do not wait until the day before the exam. Either the *Explanation of Absence Form* or my personal decision can be used to determine if you have a valid explanation for missing the assignment.

If you have no valid explanation, then there will be a 10% penalty per day, including the weekend. The assignment is considered late if it is not handed in at the start of class on the day it is due and the day we go over it. It is considered to be handed in the next day if it is handed in after the start of class or if class did not meet that day, then after I leave to go home. **Makeup exams require 24 hour advance notice so that I can write another exam.** Suppose that an assignment or exam is scheduled on a Wednesday and you are sick and I determine that you have a valid reason for Wednesday and Thursday. If you turn it in on the following Monday after class has met, then it will be considered four days late. Those days are Friday, Saturday, Sunday, and Monday because it was the day that we went over it in class – it was due at the start of class – so it is counted as handed in on Tuesday.

(C) Calculators: I will not permit use of graphing calculators or any other calculator which can store equations. The HP 10B and the TI BA II Plus are acceptable in all courses in Economics, Accounting, and Business. The former is the preferred calculator.

(D) Course readings:

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(i) **Required text:** *Mathematics for Economics* by Hoy, Livernois, McKenna, Rees, and Stengos. The third edition is copyright 2011 by MIT Press.

(ii) **Background readings:** All assignments from every time I taught this course are available on my web page: <http://www.WCsaplarJr.info/>.

VII. Grading, Evaluation and Assessment Procedures, including Grading Scale:

(A) Point Distribution: There will be daily class participation, weekly homework assignments, four exams, and a final exam. Because the topics covered require analytical thought, rather than memorization, the majority of the questions will be problem solving. There are 1000 points available during the semester. The grades are calculated as follows:

| | | |
|-------------------------|----------------|---------------------------------|
| Class participation | 2% | 20 points |
| 10 homework assignments | 10% (1% each) | 100 points (10 = 100*1/10 each) |
| The four exams combined | 68% (17% each) | 680 points (170 = 100*1.7 each) |
| Final exam | 20% | 200 points (200 = 240*5/6) |

If we end up with 9 assignments, then the 10th assignment grade will be the average of the other 9.

(B) Grading Scale: The minimum scores necessary to get each grade will be:

| | | |
|---------------------|--------------------|---------------------|
| A+ 97% = 970 points | A 93% = 930 points | A- 90% = 900 points |
| B+ 87% = 870 points | B 83% = 830 points | B- 80% = 800 points |
| C+ 77% = 770 points | C 73% = 730 points | C- 70% = 700 points |
| D+ 67% = 670 points | D 63% = 630 points | D- 60% = 600 points |
| | F 0% | |

The borders are not firm. Any student near the border of two grades will have their case looked at on a case by case basis after the final exam has been graded.

VIII. Grading Rubric:

(A) Class Participation: The class participation grade is 0 to 5. 0 means you were not in class and 5 means you were there on time, participated, did not leave in the middle or early, did not text message or use the phone, did not carry on a private conversation, did not sleep, and did not do work for another class. Each of those discouraged activities lowers your grade. If we stay online for the rest of the semester, then this grade is already determined.

(B) Homework Assignments: This course has weekly homework assignments. Homework assignments are the only area that I allow students to work together. In fact,

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I recommend that you work together on these assignments because the better students learn the material better by teaching it and the poorer students get another person teaching it and may learn it better. However, if I find that students have worked together on any assignment other than the homework assignments, I will consider it as cheating. See the next section.

IX. Academic Honesty: Each student in this course is expected to abide by the Bethany College Policy on Academic Honesty (see College Catalogue section on Academic Honesty). Any work submitted by a student in this course for academic credit will be the student's own work.

For this course, collaboration is allowed for homework assignments. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, a diskette, or a hard copy. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and College disciplinary action.

I have zero tolerance for cheating, lying, copying, plagiarism, etc. The first time that I find you cheating, I will definitely give a zero for the assignment. I may also flunk you for the whole course. I have done it here and many times in the past at other schools.

X. Behavioral Expectations, Classroom Etiquette: See grading rubric.

XI. Electronic Communication and Course Management:

My web page is <http://www.WCsaplarJr.info/>. On it will be all current syllabi, current announcements, and old assignments for all courses I have taught at Bethany College. If you miss a class, you can find the material covered and any new assignment on the page. You can also find my class and office hours' schedule.

XII. Accommodations for students with disabilities: This class respects and welcomes students of all backgrounds, identities, and abilities. If there are

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circumstances that make our learning environment and activities difficult, if you have medical information that you need to share with the instructor, or if you need specific arrangements in case of an emergency, please let the instructor know. The instructor is committed to creating an effective learning environment for all students, but the instructor can only do so if you discuss your needs with the instructor as early as possible. The instructor promises to maintain the confidentiality of these discussions. If appropriate, also contact the McCann Learning Center (accommodations for learning disabilities) or the 504 Coordinator (medical accommodations and accessibility) to get more information about specific information. The McCann Learning Center is located on the second floor of Cramblet Hall and the 504 Coordinator is located in Student Life in Bethany House.

XIII. Title IX Disclosure: Your instructor is a mandated reporter of suspected discrimination. Please do not share anything regarding sexual harassment or discrimination if you wish to keep it expressly confidential. Please see the College's Title IX policy in Volume VII of the Policy Manual. A hard copy can be obtained in the Office of Student Life, or an electronic copy can be found on the College's website (<http://www.bethanywv.edu/students/title-ix/>).

XIV. Tentative Course Schedule:

| Mon. | Monday Classes | Wed. | Wednesday Classes | Fri. | Friday Classes |
|------|-----------------------|------|---------------------------|------|---|
| 1/13 | Chapters 1 & 2.1 | 1/15 | Chapters 2.1 - 2.2 | 1/17 | Chapter 2.3 Homework #1 Due |
| 1/20 | Chapter 2.4 | 1/22 | Chapters 2.4, Rev. HW #1 | 1/24 | Ch 2.4 - 3.3 Homework #2 Due |
| 1/27 | Chapters 3.4 -3.5 | 1/29 | Review HW #2 & #2A | 1/31 | Exam #1 on Chapters 1-3.4 |
| 2/3 | Chapter 3.5 | 2/5 | discontinuous Ch. 5.1-5.4 | 2/7 | Review Exam #1 HW #3 Due |
| 2/10 | Chapter 5.4 | 2/12 | Chapter 5.4 Review HW#3 | 2/14 | Chapters 5.4 - 5.5 HW #4 Due |
| 2/17 | Chapters 6.1 & 6.2 | 2/19 | Chapter 6.3 Review HW #4 | 2/21 | Chapters 6.3 & 7.1 HW #5 Due |
| 2/24 | Chapters 7.1 & 7.2 | 2/26 | Review Homework #5 & 5A | 2/28 | Exam #2 Ch 3.5, 5.1-5.5, 6.1-7.1 |
| 3/2 | Chapter 7.2 | 3/4 | Chapters 7.2 & 8.1 | 3/6 | Review Exam #2, HW #6 Due |
| 3/9 | Spring Break | 3/11 | Spring Break | 3/13 | Spring Break |
| 3/16 | Chapter 8.2 | 3/18 | Chapter 8.2- 8.4 Rev HW#6 | 3/20 | Chapters 8.4 - 9.1 HW #7 Due |
| 3/23 | Chapter 9.1 - 9.2 & 3 | 3/25 | Review Homework #7 & 7A | 3/27 | Exam #3 Chapters 7.2 - 9.1* |
| 3/30 | Chapters 9.2 & 3 | 4/1 | Chapter 9.4 | 4/3 | Review Exam #3 Hmwrk #8 Due |
| 4/6 | Chapters 11.1 & 11.2 | 4/8 | Chapter 11.2 Review HW#8 | 4/10 | Chapter 11.3 Homework #9 Due |
| 4/13 | Easter Monday | 4/15 | Chapter 11.3 Review HW#9 | 4/17 | Chapter 11.3 Homework #10 Due |
| 4/20 | Chapter 11.4 | 4/22 | Review HW#10 & 10A | 4/24 | Exam #4 Chapters 11.1 - 11.4 |
| 4/27 | Chapter 11.5 | 4/29 | Chapter 11.5 | 5/1 | review Exam #4 & grades printout |

This is the original schedule. If we come back to campus, we will go back to this schedule.

Week of 3/23 We will cover Chapter 8 and Homework #7 will be due on 3/27.

Week of 3/30 We will have a review session on Monday and Exam on Wednesday.

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Friday, we will start Chapter 9.

Week of 4/6 We will have HW #8 due Wed and cover the rest of Chapter 9. We will start Chapter 11.

Week of 4/13 HW #9 will be due on Wednesday. We will cover more of Chapter 11.

Week of 4/20 HW#10 will be due on Monday. We will cover more of Chapter 11. The exam will be on Friday.

Week of 4/27 We will cover more of Chapter 11.

The review sessions for the exams will generally be the night before the exam.

The final exam will be Tuesday 5/5 at 10:00.

XV. Note: This syllabus is subject to change at the discretion of the professor.