

University of Montana

## ScholarWorks at University of Montana

---

University of Montana Course Syllabi, 2021-2025

---

Spring 2-1-2022

### ECNS 291.01: Mathematical Economics

Douglas Dalenberg

*University of Montana, Missoula*, [doug.dalenberg@umontana.edu](mailto:doug.dalenberg@umontana.edu)

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi2021-2025>

**Let us know how access to this document benefits you.**

---

#### Recommended Citation

Dalenberg, Douglas, "ECNS 291.01: Mathematical Economics" (2022). *University of Montana Course Syllabi, 2021-2025*. 637.

<https://scholarworks.umt.edu/syllabi2021-2025/637>

This Syllabus is brought to you for free and open access by ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Course Syllabi, 2021-2025 by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

**UNIVERSITY OF MONTANA**  
**ECNS 391: ST Mathematical Economics**

**Course Information:**

Semester: Spring 2022  
Section: Section 01  
Meeting time and Classroom: MWF 12:00-12:50 in LA 302  
Credits: 3 credits  
CRN: 33943

**Instructor Information:**

Instructor: Douglas Dalenberg  
Office: LA 413  
Email: [doug.dalenberg@mso.umt.edu](mailto:doug.dalenberg@mso.umt.edu)  
Phone: 406-243-4406 (message only – email will get a faster response).  
Office hours: MWF 1:00-1:50, W 3:00-4:00 or by appointment.

**Teaching Assistant:**

TA: Jared Gibbs  
Office: LA 410  
Email: [jared.gibbs@umconnect.umt.edu](mailto:jared.gibbs@umconnect.umt.edu)  
Office hours: MWF 11-12:50, TR 1-1:50, R 3:30-4:50  
Zoom: <https://umontana.zoom.us/j/98785112346>

**Course Description:**

This course presents a set of mathematical tools that are used in economics. Application of these tools is illustrated using problems from a number of fields in economics including, but not limited to, microeconomics, macroeconomics, and econometrics. A section of the course focuses on the interpretation of empirical results presented in journal articles. The course also examines the important issue of causal inference in economics.

**Prerequisites:**

You need a background in algebra. An ALEKS score  $\geq 4$  or an M02  $\geq 14$  or successful completion of MATH 121 College Algebra or higher.

**Required Text:**

None.

**Course Moodle Page:**

The course Moodle page will contain the course documents.

**Learning Outcomes:**

Students who successfully complete ECNS 391 will be able to:

1. apply partial derivatives to solve optimization problems in economics.
2. apply integrals to find consumer surplus and deadweight loss.

3. apply tools from introductory linear algebra to a variety of economic problems.
4. interpret the empirical results presented in quantitative economics journal articles.
5. articulate the issues and possible solutions to causal inference problems.

### Assessment:

Assignment	Weight	Date (Subject to change)
5 Homework	50%	2/16, 3/9, 4/6, 4/20, 5/4
5 Quizzes (Quiz 5 given for final exam)	50%	2/23, 3/14, 4/11, 4/25, 5/9 (10:10-12:10)

I will use plus/minus grading so 100-92=A, 91-90=A-, 89-88=B+, 87-82=B, 81-80=B-, 79-78=C+, 77-72=C, 71-70=C-, 69-68=D+, 67-60=D, 59 and below=F.

### Policies:

#### Health

1. I will be following the University Covid-19 recommendations for classrooms. Currently they require a mask in class and indoors. The mask policy can be found on the [Student Affairs](http://www.umt.edu/student-affairs/community-standards/) website (<http://www.umt.edu/student-affairs/community-standards/>). Please make sure your mask covers your mouth and nose and is worn properly.
2. If my office hours conflict with your schedule, contact me for an appointment (in-person or Zoom). I will require masks in my office. If that does not work for you, we will meet over Zoom or outside.
3. Although attendance is not part of your course grade, attending class is important for your learning. I will be taking attendance and making a seating chart to assist with contact tracing but it is not a direct component of your grade.
4. Let's keep our classroom a healthy environment. Do not come to class if you are sick. If you feel sick and/or are exhibiting COVID-19 symptoms, please don't come to class and contact the Curry Health Center at (406) 243-4330. If you are a close contact with someone who tests positive, we will follow University policies. If I must miss class, I will notify you via email.
5. If you are required to isolate or quarantine, I will work with you to be sure you have access to the recordings and handouts and I will meet with you over Zoom for questions you have.
6. UM (and I) recommend you get the COVID-19 vaccine and booster. Please direct your questions or concerns about vaccines to Curry Health Center.

#### Classroom

1. In order to keep us safe, please no food or drinks in the classroom.
2. I will be recording the classes and posting the recordings on Moodle. The recordings are not a perfect substitute for attending class and there are some things such as class activities that the recording will miss but they can be a good resource.
3. If you miss a quiz and you contact me prior to or immediately after the quiz, we will make arrangements for dealing with the missing score (usually a make-up quiz). If I am not contacted promptly, then no make-up is possible.
4. Late homework is penalized with a deduction of points reflecting the cost it imposes on me or my TA to grade it. Homework is considered late if I receive it after we have finished grading those assignments handed in on time.
5. A classroom is a community, so I trust you will act as a mature and responsible citizen and treat each other with respect and courtesy. As one courtesy to your classmates, set your cell phones

to vibrate and leave the class if you must take a call.

## University

1. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Office of Disability Equity, please contact them in Lommasson Center 154. I will work with you and the Office of Disability Equity to provide an appropriate modification. For more information, visit the [Office of Disability Equity](https://www.umt.edu/disability/) website (<https://www.umt.edu/disability/>).
2. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the [Student Conduct Code](http://www.umt.edu/student-affairs/community-standards/) (<http://www.umt.edu/student-affairs/community-standards/>). Academic dishonesty will result in a score of zero for the work in question and possible university sanctions.
3. The University sets deadlines for adding classes, dropping classes, changing grade options, and changing to or from audit status. These policies can be found at the [Registrar's web page](https://www.umt.edu/registrar/students/drop-add/default.php) (<https://www.umt.edu/registrar/students/drop-add/default.php>) while the actual dates for this term can be found on the [Registrar's calendar](https://www.umt.edu/registrar/calendar/spring-2022.php) (<https://www.umt.edu/registrar/calendar/spring-2022.php>).
4. UM has a Cultural and Ceremonial Leave Policy which states: "Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student's customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student's attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor."

## Calendar:

This schedule of topics is subject to modification. All changes will be announced in class.

Week	Date	Topic	Assignments	Quizzes
1	1/17 1/19 1/21	<i>Holiday</i> Mathematics and Economics Pct Change and Index #s		
2	1/24 1/26 1/28	Index # details Functions Functions		
3	1/31 2/2 2/4	Derivatives Derivatives Partial Derivatives		
4	2/7 2/9 2/11	Partial Derivatives Elasticities Total Differential		
5	2/14 2/16 2/18	Optimization Constrained Optimization Function extensions	Homework 1 due	
6	2/21 2/23 2/25	<i>Holiday</i> Quiz 1 Integrals		Quiz 1
7	2/28 3/2 3/4	Integrals Linear Algebra Linear Algebra		
8	3/7 3/9 3/11	Linear Algebra Linear Algebra 2 <sup>nd</sup> order conditions	Homework 2 due	
9	3/14 3/16 3/18	Quiz 2 2 <sup>nd</sup> order conditions Spreadsheets		Quiz 2
	3/21 3/23 3/25	<i>Spring Break</i> <i>Spring Break</i> <i>Spring Break</i>		
10	3/28 3/30 4/1	Set Theory Distributions Expected Value		
11	4/4 4/6 4/8	Statistical Measures Properties of Estimators Statistical Inference	Homework 3 due	
12	4/11 4/13 4/15	Quiz 3 Statistical Inference Empirical Journal Applications		Quiz 3
13	4/18 4/20 4/22	Empirical Journal Applications Empirical Journal Applications Causal Inference	Homework 4 due	
14	4/25 4/27 4/29	Quiz 4 Causal Inference Causal Inference		Quiz 4
15	5/2 5/4 5/6	Applications of Causal Inf Applications of Causal Inf Wrap up	Homework 5 due	
16	5/9 (Mon)	Quiz 5 (Final Exam) 10:10-12:10		Quiz 5 10:10-12:10