Course Information:
Semester: Spring 2020
Section: Section 01
Meeting time: TR 12:30-1:50
Classroom: LA 401
Credits: 3 credits
CRN: 30650

Instructor Information:
Instructor: Douglas Dalenberg
Office: LA 413
Email: doug.dalenberg@mso.umt.edu
Phone: 406-243-4406 (message only).
Office hours: TR 11:00-12:20, W 12:00-1:00.

TA: Aaron Nicholson
Office: LA 410
Office hours: TBA.
Aaron is proficient at R and LaTeX so is a good resource. He will help me grade homework.

Course Description:
Modern macroeconomics is a broad and deep field. We will approach this course from an empirical perspective by focusing on the forecasting and time series tools that are often applied by macroeconomists. Statistical software will be used to assist us in handling of complex empirical problems and to demonstrate the use of statistical software in forecasting. The ultimate objective of the course is to familiarize the student with the tools used in forecasting by macroeconomists.

Prerequisites:
A statistics course such as STAT 216.

Required Text:

Optional Software:
We will use R which is open source and available in LA 401 and many other campus labs. I will show you how to get access to R on your own computer for free. I prefer R Studio as my R interface, but you may use any interface you like. We will also use LaTeX which is also open source and I will show you how to access LaTeX on your own computer for free. There are many interfaces for LaTeX and you are free to use any interface you choose.

Moodle:
Readings and data sets used in class and for homework will be available through Moodle.
Learning Outcomes:
Students who successfully complete ECNS 513 will be able to:

1. describe the key variables that macroeconomists include in their models and explain the rationale for their inclusion.
2. explain the issues associated with time series data and forecasting as applied in macroeconomics.
3. create forecasts and perform the relevant associated tests of forecasting models.
4. demonstrate proficiency with the R statistical software program in the realm of forecasting and the LaTeX document production software.

Assessment:
The weights for the course grade are:

- Quizzes 45% 2/11, 2/25, 3/12, 3/31, 4/16.
- Homework 40%
- Take-home Final Exam Due 15% Wednesday, 5/6 at 3:00 PM.


Policies:

1. If you miss a quiz and you contact me prior to or immediately after the quiz, then we will make arrangements for dealing with the missing score (usually a make-up quiz). If I am not contacted promptly, then no makeup is possible. Homework is late if I receive it after I have finished grading the homework that was turned in at the deadline because at that point you are imposing a cost upon me. Late homework is penalized a portion of the points depending upon the cost it imposes on me.

2. If my office hours conflict with your schedule, see me for an appointment.

3. 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 Disability Services in Lommasson Center 154. I will work with you and Disability Services to provide an appropriate modification. For more information, visit the Disability Services for Students website (http://www.umt.edu/dss).

4. 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/Student%20Conduct%20Code%20-%20FINAL%20-%208-24-18.pdf). Academic dishonesty will result in a score of zero for the work in question and possible university sanctions.

5. 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 (http://www.umt.edu/registrar/students/dropadd.php) while the actual dates for this term can be found on the Registrar’s calendar (http://www.umt.edu/registrar/PDF/201970-Official-Dates-and-Deadlines.pdf).

6. 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.”

7. While I encourage you to bring your laptop to class for using R and LaTeX, I do not recommend taking notes on a computer, but rather handwrite your notes. Please do not distract other students by looking at non-class web pages during class. I have read some of the research on computer note taking and am willing to discuss my interpretation of that research with you.

8. As a courtesy to your classmates, please set your cell phones on vibrate rather than ring and please leave the classroom to talk on a phone. You may text during class if it does not disturb those sitting near you and it does not disturb me. Absolutely no texting or cell phone use during quizzes or exams. If you believe that you will need to leave during class, please sit where you will not bother others as you leave. 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. Please do not interfere with the learning of your classmates. I will ask you to leave if you are interfering with others’ learning and it would be very embarrassing for you.
**Calendar:**
This schedule of topics is subject to modification. All changes will be announced in class.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading*</th>
<th>Quizzes</th>
</tr>
</thead>
</table>
| 1    | 1/14       | LaTeX and R                          | HA chapter 1  
Reading 1 |           |
|      | 1/16       |                                       |          |                        |
| 2    | 1/21       | LaTeX and R                          | HA chapter 2  
Reading 2 |           |
|      | 1/23       |                                       |          |                        |
| 3    | 1/28       | Time Series Terminology               | HA chapter 3 |           |
|      | 1/30       |                                       |          |                        |
| 4    | 2/4        | Stationarity                          | Reading 3 |           |
|      | 2/6        |                                       |          |                        |
| 5    | 2/11       | Time Series Issues                    | HA chapter 5 | Quiz 1 Tuesday (2/11) |
|      | 2/13       |                                       |          |                        |
| 6    | 2/18       | Seasonality                           | HA chapter 6  
Reading 4 |           |
|      | 2/20       |                                       |          |                        |
| 7    | 2/25       | Tools for Real-Life Data Issues       | HA chapter 12.1, 12.9  
Reading 5 | Quiz 2 Tuesday (2/25) |
|      | 2/27       |                                       |          |                        |
| 8    | 3/3        | Filters                               | HA chapter 7 |           |
|      | 3/5        |                                       |          |                        |
| 9    | 3/10       | Masks                                 | Reading 6 | Quiz 3 Thursday (3/12) |
|      | 3/12       |                                       |          |                        |
| 10   | 3/24       | ARIMA                                 | HA chapter 8 |           |
|      | 3/26       |                                       |          |                        |
| 11   | 3/31       | ARIMA                                 | Reading 7 | Quiz 4 Tuesday (3/31) |
|      | 4/2        |                                       |          |                        |
| 12   | 4/7        | ARIMA                                 | Reading 8 |           |
|      | 4/9        |                                       |          |                        |
| 13   | 4/14       | Dynamic Regression Models             | HA chapter 9 | Quiz 5 Thursday (4/16) |
|      | 4/16       |                                       |          |                        |
| 14   | 4/21       | Combining Forecasts / Aggregates / Other Issues | HA chapter 12.2-12.8 |           |
|      | 4/23       |                                       |          |                        |
| 15   | 4/28       | Other Techniques                      | HA chapters 4, 10, and 11 |           |
|      | 4/30       |                                       |          |                        |
| 16   |            | Take-home Final Exam                  | Take-home Final Exam Due Wednesday 5/6 at 3 PM |           |

* HA refers to Hyndman and Athanasopoulos.

**Reading #s:**
2. Excerpts from Grolemund, Garrett and Hadley Wickham, *R for Data Science*, online.