**MATH 111-H01 Linear Math Modeling**                                        **Fall 2018**
TR 12:00 - 1:15   Robinson Hall B106

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| **Instructor:** Ellen O'Brien | **Office Hours:** T 1:30-2:30, W 1:30-2:30; |
| **Email:** eobrien@gmu.edu | **Office:** Exploratory Hall 4205 |

**Text and Materials:**   <u>Finite Mathematics and Its Applications</u>, *12th Edition*, by Goldstein, Schneider and Siegel, Pearson 2018
                    <u>Math 111 Data Fitting Notes</u> – available on Blackboard

**Course Description:** This course meets the quantitative reasoning requirement, one of the Foundation requirements of the Mason Core and the Math requirement for the Honor's College.  The goal of the Foundation requirement is to help ensure that students are equipped with the tools and techniques necessary to succeed in college and throughout their lives and careers. We will cover the following topics:

- Linear Equations
- Linear Systems and Matrices
- Leontiff Input/Output Analysis
- Markov Processes
- Data Fitting - Polynomial Interpolation, Least Squares
- Difference Equations

**Active Learning with Technology Classroom**:  I chose this classroom for Math 111 because the space facilitates active learning and collaboration.
 Students will be able to try problem solving skills and procedures immediately after being introduced to them.  Eliminating the time gap between the introduction of a skill and the first individual attempt (usually homework several hours later) will provide the opportunity for better retention of the mathematical concepts introduced in the course.
 The circular seating arrangement allows for comparing, sharing and discussing results. This approach is beneficial to everyone. The students who understand a concept can reinforce their understanding by explaining it others.  On the other hand, students who are not confident with a certain skill can get assistance from their tablemates.

**Student Expectations**
- Attendance- you are expected to attend every class. There will be collected/graded work on most (if not all) class days.
- Preparation- you are expected to be prepared for class. The preparation includes doing homework problems and reading the textbook. There will also be videos posted on blackboard that can be used for review and reinforcement. Please check the Math 111 Blackboard the night before **each class** for announcements and other information.
- Collaboration – I am requesting that you help other students at your table when it is appropriate. However, keep in mind that not all exercises will allow for collaboration. For instance, tests are individual efforts and sharing information about them is prohibited. Please don't hesitate to ask if you are not sure whether or not collaboration is permitted.

**Final Exam:**  Thursday, December 13 at 10:30am-1:15pm
**Tests:**
>   **Test 1** Tuesday, September 25
>   **Test 2** Tuesday,  October 30
>   **Test 3** Thursday,  November 29

**Grading:** Your grade for the course will be calculated based on three exams, collected class work, and a final exam. Matlab assignments will be worth 25 points each (total 100). Each test is worth 100 points, class work will total 100 points, and the final exam 100 points. The sum of these grades divided by 6 will determine your grade according to the scale:
>   A: 90-100    B: 80-89.9   C:70-79.9    D:65-69.9   F: below 65
+ or – will be attached to the grade for the upper or lower 2 points in each range
NO make-up TESTS or CLASSWORK will be given. If you miss an exam contact me ASAP.

**Homework:**  Homework problems will be assigned at the end of each class and presented at the beginning of the next class meeting by students. Reading the sections of the text related to the problems is a part of the homework assignment. I will post the assignment regularly on the course Blackboard.

**Calculators:**   You will need a calculator for class work, homework, and exams. Our textbook includes notes on the use of  TI-83/84. You are not required to get this particular calculator but if you have one, feel free to use it. Matrix computations on graded class work and exams are to be **done by hand**.

**Honor Code**: Sharing information of any kind about exams is an Honor Code violation. The assigned *Matlab* problems are *NOT GROUP PROJECTS*. Each student is to work independently at the computer terminal and hand in his or her own computer printout. Any violations will be referred to the Office of Academic Integrity.

**Disability statement:**  If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services at 703-993-2474. All academic accommodations must be arranged through that office.

**Computers:**  We will be using *Matlab* to help with matrix calculations. This software is available for student use either on campus or remotely on mason.gmu.edu. The system requires your Patriot Pass. Details for connecting will be available on Blackboard. You can use your own computer or the computers available in the Johnson Center in rooms 342. For open hours see
>   *http://doit.gmu.edu/faculty-and-staff/computer-labs/computer-lab-locations/*

**General Remarks:** Please be considerate of other students in the class.  Turn your cell phones off before entering the classroom and keep the noise level at a minimum.
Be respectful of other students in the class. We all have different experiences in Mathematics. What is easy for one person may be challenging for another.

The following is a tentative schedule for the course:

| T | R |
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| Aug. 28:  Sec 1.1<br>        Linear Models and Graphs | Aug. 30: Sec 1.2,<br> Slope of a line; Writing Linear Equations |
| Sept: 4:  Sec 1.3, 2.1<br>Intro to Matrix method of solving systems. | Sept. 6:  Sec 2.1<br>Matrix Method of solving systems of Equations; Row Operations |
| Sept. 11:  Sec 2.2<br>    Gaussian Elimination | Sept. 13:  Sec 2.3<br>            Matrix Operations: Multiplication and Addition |
| Sept 18:  Sec 2.4<br>        Inverse of a Matrix | Sept. 20:  Sec 2.4<br>        Matrix Equations |
| Sept. 25:  **Test 1** | Sept. 27: Introduction to Matlab |
| Oct. 2:  Sec 2.5, 2.6<br>        Gauss-Jordan Method of finding Inverses | Oct. 4:  Sec 2.6<br>            Leontiff Input-Output Analysis |
| Oct 9:  Columbus Day<br>            No Class | Oct 11:  Sec 8.1<br>            Markov Processes |
| Oct. 16:  Sec 8.1, 8.2<br>        Markov Processes | Oct. 18:  Sec 8.2<br>    Processes with Stable Distributions |
| Oct. 23:  Sec 8.3<br>        Absorbing States and Absorbing Matrices | Oct. 25: Chapter 8 Problems |
| Oct. 30: **Test 2** | Nov. 1:  Sec 1.5<br>            Method of Least Squares |
| Nov. 6: Data Fitting<br>        Models | Nov. 8:  Data Fitting<br>            Polynomial Interpolation |
| Nov. 13:  Data Fitting<br>        Least Squares | Nov. 15:  Data Fitting<br>            Exponential Model |
| Nov. 20:  Data Fitting<br>        Power Law Model | Nov. 22:  Thanksgiving Break |
| Nov. 27:  Sec 11.1<br>Introduction to Difference Equations | Nov. 29: **Test 3** |
| Dec. 4:  Sec 11.2; 11.3<br>        Difference Equations as models; Properties of Difference Equation Graphs | Dec. 6:  Sec 11.3<br>            Graphing Difference Equations |
| Dec. 11: No Class | Dec. 13: **Final Exam**<br>            **10:30-1:15** |
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- September 30 is last day to drop
- October 1 – October 28 is the Selective withdrawal period