Marshall University Syllabus

Course Title/Number	**Math 160: Applied Mathematical Reasoning**
Semester/Year	Fall 2015
Meeting Day/Time	The course meets for 5 hours each week. • Monday and Wednesday 2:00–2:50pm • Tuesday and Thursday 2:00–3:15pm
Location	Weisburg Applied Engineering Center 3121
Instructor	Carl Mummert
Office	Morrow Library 110
Office Phone	304 696-6156
Email	mummertc@marshall.edu
Office Hours	My office hours are in the math tutoring lab, Smith Music 115. • Tuesday and Thursday 9:00–11:30am in SM 115 • Wednesday 3:00–4:00pm in SM 115
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/policies. *Policies:* Academic Dishonesty / Excused Absence Policy for Undergraduates / Computing Services Acceptable Use / Inclement Weather / Students with Disabilities / Academic Dismissal / Academic Probation and Suspension / Academic Rights and Responsibilities of Students / Affirmative Action / Sexual Harassment.

About this course

Math 160 meets your *core curriculum* requirement for mathematics.

Math 160 is a *critical thinking* (CT) course. You will receive 5 hours of CT credit towards your core curriculum requirements. Every section of Math 160 is a CT course.

This section of Math 160 is designated as "Writing Intensive". You will receive 5 hours of WI credit towards your core curriculum requirements. Not every section of Math 160 is a WI course.

For majors in Criminal Justice, Math 160 also meets the mathematics requirement for your major. This is true regardless of which section of Math 160 you take.

Course Catalog Description

Math 160 is a critical thinking course in applied mathematical reasoning. Topics include logic, problem solving, linear modeling, beginning statistics and probability, exponential and logarithmic modeling, formula use. 5 credit hours.

Prerequisite

Math ACT 19, Math SAT 460, MTH 099, or equivalent. The prerequisites for this course are the same as for MTH 127. Please note that MTH 121 and MTH 121B do not qualify as prerequisites for this course.

Topics – what does the course include?

The course has three main parts, each of which will fill about one third of the semester. Because Math 160 is a five credit hour course, this means that you will receive the equivalent of 1.5 credit hours in each of the three topics.

Part 1: Logic and fallacies

You will be able to make your own arguments stronger, and understand when you are being misled, by understanding the general patterns behind logical arguments and the common errors. A solid understanding of logic will also help you interpret written documents precisely. For those who go on to graduate school or law school, logical reasoning is a component of entrance exams such as the GRE and LSAT.

Part 2: Algebra and modeling

How far will a car skid on pavement, under maximum braking, if it was traveling 40mph? How long will it take for a person's body to process a given amount of an ingested chemical? Problems like these, which ask for numerical answers, are best solved through algebraic methods. In this class, we will focus on *modeling* – the application of algebraic techniques to real-world problems. We will sometimes discuss techniques on their own, but only when we expect you will need those techniques later.

Part 3: Statistics and probability

From the lottery to the newspaper, statistics are unavoidable, but they can be deceptive. You need to know what they mean and how they can be misused. This class will introduce you to the basics of statistics and probability. By the end, you will be able to compute simple probabilities and statistics on your own; equally importantly, you will be able to interpret statistics that others give to you. We will also discuss topics such as the reliability of DNA testing, which turns out to be closely related to conditional probability.

Requirements – what do you need to have?

Textbook

Applied Mathematical Reasoning, second edition, by Brase, Brase, and Johnson.
This is a custom text published by Cengage. It is available in the Marshall University Bookstore. ISBN 978-1-305-75805-6. The first edition will not work, because the contents have changed substantially.

Paper

You should bring your calculator, paper, and a pen or pencil to every class meeting.

Calculator

You need to have a scientific or graphing calculator during the course. The calculator must be able to perform powers (x^y) and logarithms. Phones, tablets, laptops, and cellular or networked devices are not permitted on quizzes.

Computer access

You must have internet access at your residence. Check your official MU email account daily. Course handouts, announcements, and grades will be posted on MU Online. You will submit projects on MU Online. Online homework will be on MU Online. You do not need to purchase any license for the online homework.

MU Online

It is important to visit MU Online regularly for up-to-date information about the course. It hosts all the course materials including announcements, handouts, assignments, and reading materials. Although I will make my best effort to announce everything in class, it is your responsibility to keep up to date with assignments on MU Online.

Assignments – what do you have to do?

There are several kinds of assignments in this course:

- *Online Homework* (15% of grade): Homework will be assigned on MU Online. There will be one homework set each week, usually due on Thursday evening. You can (and should) bring questions about homework problems to class, office hours, or the tutoring lab.
- *Low Stakes Practice Quizzes* (10% of grade): These quizzes will focus on the topics discussed in class and in the homework. You will be graded on a credit / no-credit basis, with credit for completing the quiz with a reasonable effort.
- *Projects* (25% of grade): There will be three projects during the semester, one on each of the three main topics of the course.

Project due dates	
Project 1: Logic	Thursday, September 17
Project 2: Algebra	Thursday, October 22
Project 3: Statistics	Thursday, November 19

- *Exams* (50% of grade): There are two in-class exams and one final exam. Each exam is worth 20% of the course grade.

Exam dates	
Exam 1: Logic	Tuesday, September 22, 2:00pm
Exam 2: Algebra	Tuesday, October 27, 2:00pm
Exam 3: Statistics	Monday, December 7, 12:45pm

Projects

You will complete three projects during the semester, one for each of the three main parts of the course. These projects will require you to write prose responses of a modest length (2–3 pages), and create additional documents using Excel. Detailed instructions will be provided for each project. The due dates are listed above. You will submit your projects electronically using MU Online.

GEAR upload

You will be required to upload one of your projects to a website for Marshall's quality review program. More details will be given during the semester.

Overall grading scale

Your overall grade in the course is a weighted average. At the end of the semester, your overall letter grade will be assigned on the following scale:

90 – 100: A	80 – 90: B	70 – 80: C	60 – 70: D

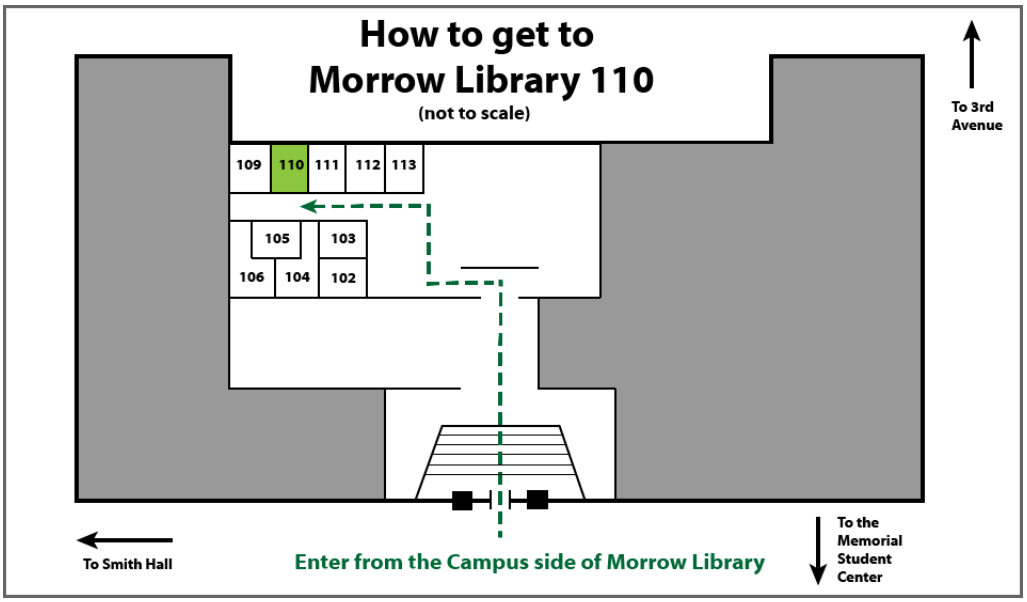
You can view your grades on MU Online at any time.

How to get extra help

Office hours

My office hours will be held in the math tutoring lab, Smith Music 115. They are 9:00–11:30am Tuesday and Thursday, and 3:00–4:00pm Wednesday.

I am always happy to answer questions or talk about the course material any time. Just send me an email or stop by my office, Morrow Library 110.



Tutoring labs

In addition to office hours, there are two **free** tutoring options for students in Math 160. The Mathematics Department has a free **drop-in** tutoring lab in Smith Music 115. The University College offers **appointment-based** tutoring in Laidley Hall. For additional information, please see http://www.marshall.edu/math/tutoringlab.asp .

Course policies

Anti-plagiarism policy

Plagiarism of any kind is not permitted. Students who plagiarize on an assignment will in most cases receive a zero for that assignment, and the university-wide plagiarism policy will be followed. The expectation is that all work you submit is your own, and that all uses of reference material are attributed appropriately. The university policy on academic dishonesty has additional details about the definition of plagiarism.

Audio/visual recording policy

You are permitted to make audio recordings of this class, provided that you notify me in advance. I will notify the class so they are also aware. Recordings must be deleted after the semester ends. If you have an accommodation from the Office of Disability services that relates to audio/visual recording, it will be honored; please contact me.

Attendance policy

I expect you to attend every class unless you have an excused absence. I will keep a record of attendance each day. There is no direct grade for attendance.

- Because there are so many quizzes, no make up quizzes are given, but if you have an excused absence for a quiz it will not count at all.
- If you have an excused absence for homework, I will give you an extension of a few days to complete it. You must make up all homework before the extended deadline.
- If you have an excused absence for the day a project is due, I will give you an extension of a few days. You should plan on completing your projects before the due date, however. Don't wait until the last moment to get started.
- Make up exams are only given for excused absences. You are always welcome to take exams early, regardless whether you have an excused absence, as long as you make arrangements two weeks before the exam date.

In any case, any make up work must be completed before the end of the last day of classes.

To obtain an excused absence, please talk to me first. I may be able to handle it myself, or I may refer you to the Dean of Students in the MSC. Details about excused absences are in the next section of this syllabus.

Excused absences

For brief illnesses of one class day, please contact me directly. Send me an email before class, if possible, to let me know you will not be present. In case of repeated absences of this sort, I may request documentation or require you to contact the Dean of Student Affairs. As long as you do not miss an exam, I can excuse occasional absences of this sort myself.

For absences that are covered by the university's excused absence policy, you can obtain an excuse from the Dean of Student Affairs in the MSC. These absences include:

1. *University-sponsored activities*: performing arts, debate and individual events, honors classes, ROTC, and departmental functions, etc. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.
2. *Athletics*: official athletic events sponsored by the Athletic Department. Your coach will give you a letter to give to your instructors.
3. *Other university activities*: student government, student organizations, etc. The organization's sponsor will will give you a letter to give to your instructors.
4. *Short-term military obligation*. You must present your orders to the Dean of Students, Dr. Steve Hensley, in the MSC.
5. *Jury duty or subpoena*. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.
6. *Religious holidays*. You must secure an excuse from the Dean of Students, Dr. Steve Hensley, in the MSC.

For other types of absences, I will decide on a case by case basis. Travel plans and work obligations can make it difficult to attend class, but they do not qualify as excused absences.

Learning outcomes

The table below shows the learning outcomes for the course. They describe the main skills that you will be tested on in the course. In general, the assignments that are intended to "practice" a skill will be graded with more partial credit than assignments that are intended to "assess" a skill.

Learning outcome	How the outcome will be practiced	How the outcome will be assessed
Demonstrate an ability to analyze arguments and construct fallacies.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Demonstrate an ability to translate natural language arguments into propositional and syllogistic forms.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Demonstrate a proficiency in utilizing formulas, solving equations and inequalities, and graphing the solutions.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Create tables and graphs from statistical data.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Interpret and analyze statistical studies.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Analyze and interpret statistical concepts such as measures of central tendency, measures of variation, and normal distributions.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Demonstrate a proficiency in the fundamentals of probability including expected value.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Compare linear growth and exponential growth rates and their real-world applications.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Apply techniques employing common logarithms to solve equations.	Discussions, low-stakes writing, homework	Quizzes, exams, projects
Enhance writing skills and strategies	Low-stakes writing, quizzes	Projects and exams

Course Objectives

1. This course will focus on the use of critical thinking to understand and interpret mathematical topics that will enable students to develop the quantitative reasoning skills they will need for a career in applied science or criminal justice.

2. Students will apply the quantitative thinking skills that they learn to analyze problems dealing with exponential growth and decay, logarithmic models, and other real-world scenarios.

3. Students will apply the inquiry based thinking skills that they learn to formulate focused questions and hypotheses, and collect and analyze data to draw justifiable conclusions.

4. Students will apply the integrative thinking skills that they learn to make connections and transfer skills and learning across mathematical disciplines and the social sciences.

5. Students will apply their information and technical literacy knowledge to research a series of projects for this course. They will use available sources to evaluate arguments for or against different propositions or available tools to analyze data.

6. Students will use their communication fluency skills to present their research. Each student will work on short projects on a variety of topics to be determined by the instructor.

Elements of critical thinking

The critical thinking domains of this course are Integrative Thinking; Quantitative Thinking; Information and Technical Literacy; Communication Fluency; and Inquiry Based Thinking This course will stress following elements of critical and integrative thinking.

1. Reasoning. This course begins with a chapter on logic. The topics include fallacies, inductive reasoning, deductive reasoning, truth tables, and Venn diagrams. These basic concepts are carried through the course as we analyze different topics in mathematics.

2. Representation. In this course students will research project topics that go beyond the material in the textbook. They will present their findings either in written form.

3. Information Literacy. Students will use a variety of sources to research the projects required for this class. Their projects will require them to use books, scholarly journals, and the Web to find the latest developments in their assigned topics.

Last updated: August 21, 2015