

Mathematics 106 – 001: Quantitative Reasoning; Spring 2019

Class Schedule: Mon & Wed: 12:00 – 1:15 PM	Location: Innovation Hall 208
Class Dates: Wed 23 Jan – Mon 6 May	Final exam: Mon 13 May 10:30 am – 1:15 pm in classroom
Instructor: Mr. Glenn Preston	Email: gpresto3@gmu.edu
Office: Exploratory Hall, Room 4309	Office Hours: MW 3:30 – 5:30; TR 12:00 – 2:00; and by appt.

Required Textbook and Other Materials:

- **Mathematical Ideas**, Charles D. Miller, Vern E. Heeren, et al; Pearson 13th Edition; [9780321977076](#)
- **MyLab Math is NOT REQUIRED.** However, if you do have a code for our textbook I have created an MLM course that you can use (Course ID = preston21269). See the MLM folder in Blackboard for instructions for enrolling.

Course Description and Learning Objectives

- **GMU Catalog:** “Quantitative skills for real world. Topics include critical thinking, modeling by functions, graphs, growth, scaling, probability, and statistics.”
- This course meets the Quantitative Reasoning Requirement, one of the Foundation requirements of the University General Education program. 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.
- The **learning objectives** for this requirement are:
 1. Students are able to interpret quantitative information (i.e., formulas, graphs, tables, models, and schematics) and draw inferences from them.
 2. Given a quantitative problem, students are able to formulate the problem quantitatively and use appropriate arithmetical, algebraic, and/or statistical methods to solve the problem.
 3. Students are able to evaluate logical arguments using quantitative reasoning.
 4. Students are able to communicate and present quantitative results effectively.
- **Glenn’s Additional Objectives:** Prepare you to be successful in courses that require analysis, deductive reasoning, problem solving skills, intuition, and insight into quantitative problems. **Also, to help you to be an effective and valued employee in your career field someday.**

Approach: WE WILL EMPHASIZE THE FUNDAMENTALS

- (1) Learn how to **diagnose** and **“attack”** problems to **determine the problem type**, underlying **concept(s)**, appropriate problem solving **technique(s)**, and to master the **mechanics** of executing the solution
- (2) **Emphasize the “5Ws”** of what we are learning: the **“who, what, when, where, why, and how”** which is what you should focus on.
- (3) Include **fundamental concepts and techniques from prerequisite courses** to ensure that you have and maintain a solid foundation in geometry, algebra, trigonometry, functions, logs/exponentials, etc.
- (4) **Emphasize graphing functions/solutions by hand** based on analysis of their properties. For almost any problem, there is an analytical (algebraic) view and a graphical (geometric) view.
- (5) **Word problems** – In the work place almost every problem you encounter is a word problem of some sort. **Problem solving is both an art and a science.** Using an organized approach is vital to being a good problem solver.

Grades: Course Average Computation and Grade Scale

	Nominal	Max Final	Max Mid-term
3 Mid-term Exams	55% (All 3)	40% (Best 2)	70% (All 3)
“Common Homework Assignment”	10%	10%	10%
Final Exam	35%	50%	20%
In-Class Extra Credit Quizzes	5%	5%	5%

- A course average will be calculated for each student using all three weightings. For each student, on an individual basis, I will use the highest average to determine the overall course grade using the grading scale below.

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F (0.0)	D (1.0)	C- (1.67)	C (2.0)	C+ (2.33)	B- (2.67)	B (3.0)	B+ (3.33)	A- (3.67)	A (4.0)	A+ (4.0)	Letter Grade (Grade Points)
< 60	≥ 60	≥ 70	≥ 72	≥ 78	≥ 80	≥ 82	≥ 88	≥ 90	≥ 92	≥ 100	Course Average

- Grades are based on an absolute scale **NOT** a “curve”. Your performance will be evaluated relative to what you need to achieve in order to be successful in future courses rather than relative to your classmates’ performance.
- All exams, quizzes, and the two Mathematica projects will have built-in **extra credit opportunities**.
- Speaking of Extra Credit: **There are no extra credit assignments or other additional work during or at the end of the semester that can be done to boost your grade.** I still get asked every semester – and the answer is still “no”.

QUIZZES & EXAMS – GENERAL INFO:

- **MAKEUP QUIZZES & EXAMS: NONE EXCEPT CONSISTENT WITH GMU POLICY AS STATED BELOW**
 - Missed quizzes and exams will receive a score of 0. There will be **no makeup quizzes or exams** except under special circumstances described below.
 - Per [GMU Academic Policy A.P.1.6.1](#), you may be able to take a quiz or mid-term exam at an alternate time **WITH PRIOR ARRANGEMENT**. This applies only to situations involving:
 - (1) **Religious Observance** - I have done my best to deconflict the course schedule with religious holidays. However, if the schedule changes or there is a situation/conflict I am not aware of, please let me know.
 - (2) **Mandatory Participation in Official University Activities** (e.g. intercollegiate athletics, GMU orchestra)
 - My strong preference is to arrange the alternate day/time to be **before** the quiz/exam is given to the class.
 - If you have a conflict, please let me know ASAP. **Last minute requests (< 48 hours) will not be considered regardless of circumstances.** Planning ahead is an important survival skill in the “real world”.
 - **If you have truly extraordinary circumstances – see me.** I’ll listen, but it needs to be a very good reason.
- **NO NOTES OR REFERENCES:** All exams and quizzes will be closed book. No notes or other reference material of any kind will be allowed. I **may** provide a reference sheet with some formulas, but most formulas, theorems, etc. I will let you know prior to the exam what, if any, reference material/formulas will be provided.
- **NO LEAVING THE ROOM AND RETURNING:** If you leave, you’re done and need to turn in your exam or quiz.

QUIZ-SPECIFIC INFORMATION:

- There will be occasional unannounced short (~10-15 min) EXTRA CREDIT in-class quizzes (perhaps 8 to 10 or so).

EXAM-SPECIFIC INFORMATION:

- On **all** exams, regardless of topic, I will be looking for you to demonstrate:
 - 1) **Good problem solving skills:** The ability to DIAGNOSE a problem to determine the type of problem, recognize and understand the FUNDAMENTAL CONCEPT(S) INVOLVED, determine and properly apply the APPROPRIATE PROBLEM SOLVING TECHNIQUE(S), and correctly EXECUTE THE MECHANICS of those techniques
 - 2) **Correct analysis, understanding, and interpretation of the solution:** For example:
 - Does the answer make sense? → Do a “sanity check” and/or estimate a “ball park” answer
 - Does the solution match given conditions and/or satisfy physical constraints of the problem?
 - 3) **A well-organized solution with a mathematically correct progression from each step to the next**
 - **SHOW YOUR WORK → LITTLE OR NO WORK = LITTLE OR NO CREDIT REGARDLESS OF YOUR ANSWER.** Don’t leave large gaps between steps, be careful with use of an equal sign → both sides must truly be equal or else it is an incorrect statement; be careful to use correct notation.
 - **WHAT YOU WRITE DOWN MATTERS** - even if you understand what you are doing, you need to properly communicate that understanding to me (and later to coworkers, customers, your boss, etc.)

COMPREHENSIVE FINAL EXAM:

- The emphasis will be on key concepts/techniques, particularly putting them together to solve “compound” problems, applications, and understanding of the “big picture” and “the 5W’s”
 - **IMPORTANT NOTE:** Per GMU Policy [A.P.3.10](#), you must take the final exam at the regularly scheduled date and time unless you have **excused absence in writing signed by your Dean or Academic Director.**

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- GMU policy allows you to arrange an alternate day/time if you have a conflict between final exams or more than two final exams on one day. If so, **let me know SEVERAL WEEKS PRIOR to the final exam.**

Homework Exercises:

- **WORD TO THE WISE:** **If you don't do a thorough and comprehensive job on the homework exercises, you will almost certainly fail the course – it is that simple.** Many have tried (myself included) to short-change the homework process and it always ends VERY badly. Don't learn this lesson the hard way.

Class Web Page/Communication:

- I will post all class materials, announcements, scores/grades on **Blackboard** and send some things via GMU email.
- **The primary way to contact me is via GMU email (gpresto3@gmu.edu)**
 - To comply with GMU policy and protect your privacy, I will try to only send email to your GMU email address. **Please only send email to me from your GMU email so I can use the “reply” function in responding to you.**
 - I will try to reply to each email ASAP, but please bear in mind that with 130 students between 2 classes it may not be right away. In case of emergency you can text me at (703) 405-0344 (text only please, no calls)

Honor Code: THIS IS VERY IMPORTANT

- **It is expected that each student in this class will conduct himself or herself within the guidelines of the Honor Code.** Among other things, this means that sharing information of any kind about exams or quizzes (either before or during the exam) is forbidden. Any alleged issues related to the honor code will be brought to the attention of the Office of Academic Integrity. Please reread the [University Honor Code](#) and abide by it.

Other Topics:

- **Class Schedule:** The last page shows the nominal schedule for lecture topics, quizzes, exams, etc. Modifications to the schedule may be required. **You are responsible for being aware of any announced, emailed, and/or posted changes. Please check the syllabus before asking “what is on the quiz this week?”**
- **Attendance:** **Will not be taken and there is no “participation” component to your grade.** It is your choice/responsibility to show up for class, be prepared, and get something out of it. **REGARDLESS, IT IS VITAL THAT YOU KEEP PACE WITH THE COURSE SCHEDULE.**
- **Electronic devices:** **Please be courteous and silence all cell phones, pagers, iPods, and other devices during class.** You may use a laptop, smartphone, or other electronic device for capturing notes or other legitimate class related use (but NOT during an exam or quiz).
- **University Policies:** Please familiarize yourself with university policies. The University Catalog, <http://catalog.gmu.edu>, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. All members of the university community are responsible for knowing and following established policies and procedures. (See also <https://catalog.gmu.edu/policies/>)

Getting Help: Don't Let a Small Problem Turn into a big one → DON'T GET BEHIND

- **Contact me** via email and/or come see me during regular office hours or make an appointment.
- **The Math Tutoring Center**, Johnson Center, Room 344: <http://math.gmu.edu/tutor-center.php>
- **Find a buddy and/or form a study group** – There is nothing wrong with working collaboratively. However, just make sure that you don't simply “go along for the ride” when working with someone. **Watching someone else do a problem – even if you understand what they are doing – is not the same as doing it yourself**
- **Internet Resources:** I like the Khan Academy videos but there are many good resources available.

Other University Resources and Links:

- **[Office of Disability Services](#)** (ODS): Student Union Building I, Room 211, (703) 993-2474. **All academic accommodations must be arranged through ODS.** If you are a student with a disability and need academic accommodations, please contact ODS as soon as possible and do not hesitate to speak confidentially with me.
- **[Counseling And Psychological Services](#)** (CAPS): Student Union Building I, Rm 3129, (703) 993-2380

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- **Veterans:** [Office of Military Services](#): SUB I, Suite 1510 (next to Chik-Fil-A) , (703) 993-1316
- **Mathematical Sciences Department:** Exploratory Hall room 4400, (703) 993-1460

My Commitment to You:

- So far all of the rules/policies have been imposed on you. However, you have a right to expect certain things from me. I have responsibilities to each student and to the class as a whole. My commitment to the class is that I will:
 - Do my best to follow my own advice/rules and lead by example – i.e. I will try to “practice what I preach”
 - Be as honest, open, and transparent as possible in how I conduct the class, consistent with maintaining proper student privacy/confidentiality and the academic integrity of the course.
 - Treat every student with respect and as an individual having individual talents and needs, within the constraints of doing what is best for the class as a whole. Everyone learns a little differently and some students need more and/or different types of help than others.
- **Bottom line:** To be successful in this course you will need to do more than just the bare minimum. Therefore, I am ready, willing, and able to do more than the minimum required of me (e.g. extra office hours, review sessions, provide supplemental material, whatever I can do to help students realize their potential). I will help you in any appropriate way, however, **just remember that you learn by doing and “only you can do the doing”.**

*** Class Lecture/Exam Schedule (Subject to Change) ***

Unless there are class cancellations we will stick to this schedule. Exams will cover scheduled sections regardless of how much of any particular chapter section we cover during each lecture.

WK	MON	WED	WK	MON	WED
1	21 JAN NO CLASS	23 JAN Intro, 1.1	9	18 MAR 11.5	20 MAR Review
2	28 JAN 2.1, 2.2	30 JAN 2.2, 2.3	10	25 MAR Exam-2: Ch. 10 & 11	27 MAR 7.1, 7.2
3	4 FEB 2.4, 3.1	6 FEB 3.2, 3.4	11	1 APR 7.3, 7.5	3 APR 12.1, 12.2
4	11 FEB 3.6, 6.5	13 FEB Review	12	8 APR 12.2, 12.3	10 APR 12.3, 12.4
5	18 FEB Exam-1: 1.1, 2, 3, 6.5	20 FEB 10.1, 10.2	13	15 APR 12.4, 12.5	17 APR Review
6	25 FEB 10.2, 10.3	27 FEB 10.5	14	22 APR EXAM-3: Ch. 10 & 11	24 APR 13.1, 13.2
7	4 MAR 11.1, 11.2	6 MAR 11.2, 11.3	15	29 APR 13.2, 13.3	1 MAY 13.4, 13.5
8	11 MAR SPRING BREAK	13 MAR	16	6 MAY 13.5	8 MAY NO CLASS
COMPREHENSIVE FINAL EXAM MON 13 MAY 11:30 am – 1:15 pm Innovation Hall 208					

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***** Homework Exercises *****

I HIGHLY recommend reading the upcoming chapter section(s) and attempting the homework BEFORE we cover the material in class. You will get MUCH more out of class and will stay ahead of the game.

Homework Exercises (x – y odd only, red bold = even #)

Ch	Chapter / Section Title	Exercises
1: The Art of Problem Solving		
1.1	Solving Problems by Inductive Reasoning	1, 3, 7 – 11, 15, 19 – 25, 35, 37, 47 – 53, 57
2: The Basic Concepts of Set Theory		
2.1	Symbols and Terminology	1, 3, 7 – 11, 15, 21, 23, 27 – 31, 39, 41, 45, 47, 51, 55 – 61, 67, 69, 91
2.2	Venn Diagrams and Subsets	1 – 9, 13, 15, 19 – 35, 51, 53, 57, 61
2.3	Set Operation and Cartesian Products	1 – 19, 37 – 43, 55, 57, 63 – 69, 75
2.4	Surveys and Cardinal Numbers	1 – 11, 15, 17, 23, 27, 28 , 31
3: Introduction to Logic		
3.1	Statements and Quantifiers	1 – 5, 15 – 19, 23 – 29, 33, 39 – 43, 47 – 63, 77
3.2	Truth Tables & Equivalent Statements	1 – 7, 13 – 17, 23 – 29, 41, 43, 49 – 57, 63 – 67, 77, 83
3.4	Conditional & Related Statements	1 – 5, 11 – 15, 19 – 31
3.6	Analyzing Arguments with Truth Tables	1 – 5, 9, 11, 13 – 21, 29 – 33, 37, 39
6: The Real Numbers and Their Representation		
6.5	Applications of Decimals & Percents	1 – 7, 19 – 23, 31, 33, 41, 49, 51, 63 – 69, 73, 77, 81, 93, 103, 107 – 111
10: Counting Methods		
10.1	Counting by Systematic Listing	1 – 7, 21 – 27, 35 – 41, 45, 47, 51, 53
10.2	Using the Fundamental Counting Principle	3 – 7, 13, 15, 23 – 31, 37 – 41, 55, 61 – 67
10.3	Using Permutations and Combinations	1 – 9, 13, 17, 21 – 25, 29 – 33, 37 – 41, 45 – 49, 57, 59, 65
10.5	Counting Problems Involving "Not" & "Or"	5 – 15, 21 – 37, 47 – 51
11: Probability		
11.1	Basic Concepts	1 – 7, 11 – 17, 23, 29, 45, 49, 67, 73, 77
11.2	Events Involving "Not" and "Or"	1, 5, 7, 11 – 15, 21 – 25, 33, 43, 47, 49
11.3	Conditional Probability; Events Involving "And"	1 – 17, 21, 23, 27 – 31, 43 – 49, 71, 73
11.5	Expected Value	1, 3, 7 – 11, 17, 37, 45, 47
7: The Basic Concepts of Algebra		
7.1	Linear Equations	1 – 7, 21 – 25, 33, 35, 39, 51, 57, 59, 63, 65, 71, 73
7.2	Applications of Linear Equations	13 – 23, 29 – 37, 41 – 47, 51, 55, 59
7.3	Ratio, Proportion, and Variation	3 – 7, 11, 13, 17, 19, 25, 31, 35, 37, 45, 47, 51, 55, 61, 63
7.5	Properties of Exponents and Scientific Notation	1, 3, 7 – 11, 23 – 27, 45 – 53, 59 – 65, 67, 73, 79, 85, 87, 93
12: Statistics		
12.1	Visual Displays of Data	1 – 7, 11 – 15, 21, 25, 27, 35, 41
12.2	Measures of Central Tendency	1 – 5, 9 – 15, 21, 23, 29, 31, 41, 43, 46 , 55
12.3	Measures of Dispersion	1 – 11, 15 – 21, 23, 24 , 25, 26 , 29, 37
12.4	Measures of Position	1 – 15, 18 , 19, 21
12.5	The Normal Distribution	1 – 9, 15 – 19, 23, 25, 37, 39, 53, 57, 59
13: Personal Financial Management		
13.1	The Time Value of Money	1, 3, 7, 9, 13 – 23, 31 – 37, 41, 49, 51, 55
13.2	Consumer Credit	6, 7, 8, 9, 10, 17, 21, 23, 31, 49
13.3	Truth in Lending	1, 5 – 9, 13, 17, 21, 27, 29, 33, 35
13.4	The Costs & Advantages of Home Ownership	1 – 5, 11, 14 , 15, 17, 21, 23, 24 , 25, 26 , 35, 36 , 37, 38 , 51
13.5	Financial Investments	35 – 41, 47, 51, 55, 57, 63 – 67, 73
13.5	Extension: "To Buy or Rent?"	Will be provided
13.5	Special Topic: Retirement Planning	Will be provided