

**James Madison University**  
**Department of Mathematics and Statistics**  
**Calculus with Functions I – Math 231.1    Fall 2014**

MWF 8:00-8:50 Burruss 126, Tu 8:00-9:15 Burruss 126

**Overview:** The Math 231-232 sequence covers all the material in Math 235 (Calculus I, concentrating on limits, derivatives, and applications) as well as precalculus and algebra material, and some material from the beginning of Math 236 (Calculus II, integration and applications). This course is for students that would like some more precalculus and algebra preparation while learning calculus. You should not necessarily take this course simply because you haven't had calculus in high school, or if you think it will be "easier" than Math 235. Math 231 is no easier (many 231-232 students in fact feel it is harder), but gives you a better understanding of the material if your algebra and precalculus skills need some sharpening before leaping into Calculus proper.

**Prerequisite:** MATH 155, MATH 156 or sufficient score on the Mathematics Placement Exam. NOTE: MATH 231-232 together are equivalent to MATH 235 for all prerequisites. Not open to students who have already earned credit in MATH 235.

**Instructor:** Dr. Stephen Lucas.

**To contact me:** In Person: Roop 112, Office Hours: M 9:05-9:55, 12:20-1:10, W 10:10-11:00, F 9:05-9:55, or by appointment. Phone: 568-5104, Email: [lucassk@jmu.edu](mailto:lucassk@jmu.edu).

**Website:** Material for the course will be available through Canvas.

**Textbook:** *Calculus I with Integrated Precalculus* by Laura Taalman, W.H. Freeman & Company 2014. We will cover Chapters 0 to 4.

**Calculators:** A graphing calculator will be a very useful aid for this course. I recommend the TI-83. If your only calculator is a TI-89 or a TI-92 or any other calculator capable of symbolic manipulation, differentiation, etc, please see me as soon as possible because these types of calculators will be banned from midterms and the final exam.

**Homework, Exams and Grading:** Homework problems will be assigned in each class, and those for the *previous* week will be handed in on the *following* Tuesday. Time will be made for discussion of homework questions in class every day. A roll of dice will determine at random which ones will be graded. There will be three midterm tests, made up of reworked homework problems. Your grade will be determined as follows: Homework 15%, Midterm tests 15% (each), Final Exam 40%. The final exam is timetabled for Wednesday December 10, 2014, 8:00-10:00. Final grades will be somewhat related to  $A \geq 85$ ,  $B \geq 65$ ,  $C \geq 50$ , but will vary depending on the class average and natural divisions between raw scores. Plus/minus grades will also be provided. Borderline cases will be decided based upon class participation, effort, and performance throughout the semester.

**Attendance:** Attendance is not mandatory. However, past experience suggests there is an extremely strong correlation between attendance and passing. If you cannot make a class where homework is being collected, please give to a classmate to give to me on the day. If you miss handing in homework or a test without previously getting my permission, you will receive a zero for that homework or test. If there is a medical emergency and you cannot inform me beforehand, let me know as soon as possible.

**Getting Help:** If you need help, ask! The worst thing you can do in a math course is let things slide, since earlier material is often assumed to be known later. It is best to contact me via email. If you wish to see me outside of office hours, please make an appointment beforehand. I can't guarantee that I will be available if you come and knock on my door at a random time. You can also get help from the Math and Science Learning Center, which is a resource specifically designed for helping students in courses like this one.

**Some random advice**

- Read each section of the book either before or after the corresponding lecture, but always before you attempt the assigned questions.
- Do the homework problems as soon as possible after the lecture, so that if you have problems you can get help in time, or identify areas you want covered in more detail in the tutorials.
- Don't just copy the answers in the back of the book! Include appropriate amounts of working. True/false questions ask for reasons, so don't just write "true" or "false".
- There are a lot of homework questions, but this will force you to work consistently through the semester, not just cramming it all in a few days before a test. Try and spend roughly eight hours a week on all aspects of this course.
- Don't fall behind. If something doesn't make sense, ask me about it in lectures. It's quite likely that several other students don't understand what is causing you problems, so I can immediately try and explain it in another way. Lectures are not there for me to drone on endlessly; they are there for me to help you learn.
- If you get a bad grade in an assignment or test, don't panic. Instead, get help, and take the time to work out what you missed.
- Math is about understanding, not memorizing. If you are memorizing a lot of things you may be studying the wrong way.
- Working in groups is encouraged, since talking over problems is one of the best ways to learn. I have no problem with you working together on the assignments. However, *simply copying someone else's assignment and handing it in is plagiarism*. Write out your own version.

**Goals of the Course**

1. To develop an understanding of the logical structure and style of mathematics by:
  - a. Using reason in an orderly, cogent fashion.
  - b. Writing clear, well organized solutions to problems.

Structure refers to the foundations of mathematics and to the techniques used to build on those foundations. Style refers to the clarity, elegance, efficiency, and precision desirable in mathematical expression.

2. To develop ability to use mathematical tools to solve problems and to transfer this knowledge to analogous situations by:
  - a. Using algebra, limits, and derivatives to classify properties of power, polynomial, rational, and general algebraic functions.
  - b. Using differentiation to solve problems involving optimization and rates of change.
3. To develop computational skills such as:
  - a. Solving equations and inequalities, factoring, fraction manipulation, handling exponents.
  - b. Calculating limits and derivatives.
4. To develop an understanding of the theory of calculus and algebraic structures by knowing:
  - a. The definitions of limit, derivative, and continuous function.
  - b. The important results concerning continuous and differentiable functions including the Intermediate Value Theorem, Rolle's Theorem, the Mean Value Theorem, and the relationship between continuity and differentiability.
  - c. The theory of maxima and minima of functions.

### Proposed Math 231 Syllabus, Fall 2014

Date	Section	Homework
1-M 8/25	0.1 Numbers Sets	To Be Determined
1-Tu 8/26	0.1 Sets	
1-W 8/27	0.2 Equations	
1-F 8/29	0.3 Inequalities	
2-M 9/1	0.4 What is a function	
2-Tu 9/2	0.4 Graphs	
2-W 9/3	0.5 Basic Library	
2-F 9/5	0.6 Combining Funcs	
3-M 9/8	0.6 Trans & Symm	
3-Tu 9/9	0.6 Inverses	
3-W 9/10	0.7 Logic	
3-F 9/12	0.7 Simple Proof	
4-M 9/15	1.1 Intuitive Limits	
4-Tu 9/16	1.1 Intuitive Limits	
4-W 9/17	1.2 Formal Limits	
4-F 9/19	Catch-Up	
5-M 9/22	Test Prep	
5-Tu 9/23	Midterm I	
5-W 9/24	1.3 Delta Epsilon	

5-F 9/26	1.3 Delta Epsilon	
6-M 9/29	1.4 Continuity	
6-Tu 9/30	1.4 Theorems	
6-W 10/1	1.5 Limit Rules	
6-F 10/3	1.5 Calculating Limits	
7-M 10/6	1.6 Infinite Limits	
7-Tu 10/7	1.6 Indet Forms	
7-W 10/8	2.1 Intuitive Deriv	
7-F 10/10	2.2 Formal Derivative	
8-M 10/13	2.2 Differentiability	
8-Tu 10/14	2.2 Tangent, Leibniz	
8-W 10/15	2.3 Derivative Rules	
8-F 10/17	Catch-Up	
9-M 10/20	Test Prep	
9-Tu 10/21	Midterm II	
9-W 10/22	2.3 Product Quotient	
9-F 10/24	2.4 Chain Rule	
10-M 10/27	2.4 Implicit Diff	
10-Tu 10/28	3.1 MVT	
10-W 10/29	3.2 Curve 1 <sup>st</sup> Deriv	
10-F 10/31	3.2 Curve 1 <sup>st</sup> Deriv	
11-M 11/3	3.3 Curve 2 <sup>nd</sup> Deriv	
11-Tu 11/4	3.4 Optimization	
11-W 11/5	3.4 Optimization	
11-F 11/7	3.5 Related Rates	
12-M 11/10	3.5 Related Rates	
12-Tu 11/11	4.1 Algebra	
12-W 11/12	4.2 Power Functions	
12-F 11/14	Catch-Up	
13-M 11/17	Test Prep	
13-Tu 11/18	Midterm III	
13-W 11/19	4.2 Power Functions	
13-F 11/21	4.3 Polynomials	
Thanksgiving Break		
14-M 12/1	4.4 Rational Funcs	
14-Tu 12/2	4.4 Rational Funcs	
14-W 12/3		
14-F 12/5		