Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours MR 11:00-12:00, T 12:30-1:30 or by appointment, email: mcclend2@ferris.edu

Web: I maintain a personal web page at http://mcclendonmath.com/220.html; this page contains handouts, old exams, and lecture notes.

This course also has a Canvas shell, accessible through MyFSU or at the following web address: https://ferris.instructure.com/courses/22488. This shell exists mainly to provide you with a mechanism to submit your homework electronically.

Lectures: MTR 10:00-10:50 AM in STR 137.

Computer lab sessions: W 10-10:50 AM in STR 105.

Required materials: You need two items for this course:

1. My lecture notes, which can be obtained in either of two ways:
   - as a course pack, available at the bookstore; or
   - online, at my web page (see above for URL) as a pdf file

   You should bring the appropriate section of lecture notes to class every day as they contain the examples and notes from which I will teach the course.
2. A piece of software called *Mathematica*; a link to the site where you can download this software (for free) is on my web page.

I also recommend bringing a couple of colored pens or pencils to class each day, as some of the pictures we will draw to explain concepts are much more easily understandable when drawn in color.

Prerequisite: MATH 126 or 130 with a grade of C- or better, or the equivalent. Essentially this means algebra and trigonometry. Some of this information will be reviewed in the first week of class (see Chapter 1 of the lecture notes).

Course material: Functions, limits, differential calculus of functions of one variable, an introduction to the Riemann integral, and applications.

Learning outcomes: After completing MATH 220, it is my hope and expectation that students understand what calculus is–that is, that students know the difference between mathematics that is and is not calculus, and that given some problem solved by calculus techniques, students can identify the approximation to the solution, the parameter of the approximation, and the limiting procedure which produces the solution.

It is also my hope and expectation that students will be able to:

1. Explain why a given limit, derivative or integral does or does not exist.
2. Infer information about a function from a limit statement, derivative or integral.
3. Estimate limits, derivatives, integrals and solutions to ODEs numerically and graphically, using technology as appropriate.
4. Compute limits, derivatives, integrals and solutions to separable ODEs, using technology as appropriate.
5. Solve problems which apply limits, derivatives and integrals, using technology as appropriate.

Grading policy: Class participation: 2%. Homework: 15%. Lab assignments: 13%. Midterm exams: 13% each. Final exam: 18%. Grades will be curved at the end of the semester, but an average of 90% guarantees you at least an A-, an average of 80% guarantees you at least a B-, etc.

Disregard any course averages indicated on Canvas: those averages are not weighted properly. You will receive an update on your course grade after each midterm exam; if you need a more recent update, come to my office.

Extra credit: I offer extra credit to students who can identify typos or other errors in the lecture notes, errors in homework answers, etc. (the first student to find each goof gets the credit). The more issues you find, the more extra credit you earn.

You can also earn extra credit by responding to other student's questions on the class discussion board (see below).

Attendance policy: I have no formal attendance policy. That said, **nothing** is more correlated with strong performance in my classes than attendance in lectures.

Homework: There are almost-daily homework assignments, coming from the end of each chapter in my lecture notes, listed on the course calendar. You can submit these assignments to me on paper, or electronically through Canvas. **Homework is due at class time on the day it are due.** Here's how these assignments are graded:

- If you turn in nothing at all, you get 3/10.
- If you turn in work that appears to be copied from my answers, without necessary supporting work needed to obtain those answers, or that your supporting work is "fake", you get 0/10.
- If your work makes it seem that you made a serious attempt to solve most of the problems (especially by having appropriate work shown), you get 10/10.
- If your work makes it appear that you worked on some, but not most of the problems, you get something between 3/10 and 10/10.

While I don't deduct points for incorrect answers or errors in reasoning, I will make comments on your homework while grading to help keep you from making the same mistakes on exams.

Practice quizzes: There will be occasional in-class quizzes. These quizzes do not count for anything, but I hope you take them seriously as they provide you with practice for the exams.

Lab assignments: Most days that we meet in the computer lab, you will be given a lab assignment which requires you to use the computer package *Mathematica*. You will be given time during the class session to start the lab, but will be required to finish the lab on your own time. These labs are usually due one week after they are assigned, and are graded for correctness.

Midterms: There are four midterms given in class on the dates listed on the course calendar. You will not be permitted to use any study aids, calculators or computers on the exams. The midterms are not directly cumulative, but mathematics is "inherently cumulative".

Final exam: The final exam is optional.

- If you choose not to take the final, then for your final exam grade I will enter the average of your two lowest midterm exam grades.
  Example: your midterm exam grades are 70, 80, 90 and 100. If you do not take the final, I give you 75% on the final.
- If you take the final and your score is worse than the average of your two lowest midterm exam grades, I ignore your final exam score and for your final exam grade I will enter the average of your two lowest midterm exam grades.
  Example: your midterm exam grades are 70, 80, 90 and 100. You take the final and score 67%. I give you 75% on the final.
- If you take the final and your score is better than the average of your two lowest midterm grades, then your final exam score counts.
  Example: your midterm exam grades are 70, 80, 90 and 100. You take the final and score 82%. I give you 82% on the final.

The final is cumulative and has the same structure as the midterms, but is twice as long.

Technology usage: Calculators are never, ever, ever permitted on any quiz or exam; questions on quizzes and exams use "easy" numbers and expressions that a calculus student should reasonably be able to compute and manipulate by hand. That said, we will learn how to use a software package called *Mathematica* which you will use on lab assignments and in some of the homework. The midterm exams include some basic questions involving *Mathematica* syntax.

Office hours / Getting help: My official in-person office hours, held in ASC 2046, are from 11-12 on Mondays and Thursdays and from 12:30-1:30 on Tuesdays. Outside those hours, I am happy to meet with you most of the time when I am present. Feel free to ask me questions on lecture content, or to get help with any or all of the homework questions, and I can also videoconference with you through Zoom or Skype if needed. In office hours, I am able to discuss the material at a much more friendly pace and offer some alternate viewpoints that may help you understand the material better.

If you cannot make my scheduled office hours, you can come talk to me almost any time I am on campus. Also, I am more than happy to make an appointment to discuss the material with you. Send me an email or catch me after class.

This class also has a discussion board, accessed through the Canvas shell. You can post questions on homework and course material to this board; your classmates can earn extra credit by answering your questions (and I'll answer posts if no one else responds and I have time).

Additionally, the Academic Support Center (FLITE 120, x3543, asc@ferris.edu) may offer free tutoring as well. To schedule a (virtual) appointment with a tutor, you can use the online scheduling tool TutorTrac (located within the "Academic Support" link on MyFSU). I can also recommend tutors that you can hire.

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements should register with the Educational Counseling and Disability Services office (x3057, ecds@ferris.edu). While ECDS will send me a letter outlining

the accommodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accommodations.

Academic dishonesty: Papers will be monitored for "magic answers". Issues with academic dishonesty are taken very seriously, will almost always result in an F for the class, and will be referred to the Office of Student Conduct.

DATE	PLACE	DUE	SECTION AND TOPIC
M 8.30	STR 137		1.1: Course introduction
T 8.31	STR 137		1.2: Review of functions
W 9.1	STR 105	(1.5) 1-10	*Mathematica* lab 1: introduction / troubleshooting
R 9.2	STR 137	(1.5) 11-23	1.3-1.4: Review of lines and trigonometry
M 9.6			*No class - Labor Day*
T 9.7	STR 137	(1.5) 24-32	2.1: Introduction to the idea of the limit
W 9.8	STR 105	Lab 1	*Mathematica* lab 2: functions and graphs
R 9.9	STR 137	(2.4) 1-5	2.2: One-sided limits
M 9.13	STR 137	(2.4) 6-10	2.3: Infinite limits and limits at infinity
T 9.14	STR 137	(2.4) 11-20	3.1: Continuity
W 9.15	STR 105	Lab 2	*Mathematica* lab 3: limits
R 9.16	STR 137	(2.4) 21-34	3.2: Evaluating limits algebraically
M 9.20	STR 137	(3.3) 1-17	4.1: Introducing derivatives
T 9.21	STR 137	(3.3) 18-37	4.2: Definition of the derivative
W 9.22	STR 105	Lab 3	*Mathematica* lab 4: introducing derivatives
R 9.23	STR 137	(3.3) 38-51	4.3: Qualitative approaches to differentiation
M 9.27	STR 137	(4.4) 1-12	Review for Exam 1
T 9.28	STR 137	(4.4) 13-21	5.1: Constant function and power rules
W 9.29	STR 137		**EXAM 1 (covers Chapters 1 to 4)**
R 9.30	STR 137	Lab 4	5.2-5.3: Derivatives of trig functions
M 10.4	STR 137	(5.6) 1-10	5.4: Derivatives of exponential and logarithmic functions
T 10.5	STR 137	(5.6) 11-21	5.5: Higher-order derivatives
W 10.6	STR 137	(5.6) 22-31	6.1-6.2: Product and quotient rules
R 10.7	STR 137	(5.6) 32-46	6.3-6.4: Chain rule
M 10.11	STR 137	(6.7) 1-21	6.5: Implicit differentiation I
T 10.12	STR 137	(6.7) 22-33	6.5: Implicit differentiation II
W 10.13	STR 105	(6.7) 34-52	*Mathematica* lab 5: derivative rules
R 10.14	STR 137	(6.7) 53-74	Review for Exam 2
M 10.18	STR 137	(6.5) 75-84	7.1: Introduction to optimization
T 10.19	STR 137	(6.7) 85-96	7.2: Theory of optimization
W 10.20	STR 137	Lab 5	**EXAM 2 (covers Chapters 5 and 6)**
R 10.21	STR 137	(7.5) 1-16	7.3: More on optimization and graphing
M 10.25	STR 137	(7.5) 17-35	7.4: Examples of optimization problems
T 10.26	STR 137	(7.5) 26-35	7.4: Review of optimization problems
W 10.27	STR 105	(7.5) 36-44	*Mathematica* lab 6: applications of differentiation I
R 10.28	STR 137	(7.5) 45-58	8.1: Tangent line approximation and differentials
M 11.1	STR 137	(7.5) 69-66	8.2: LHôpital's Rule (easy cases)
T 11.2	STR 137	(7.5) 67-72	8.2: L'Hôpital's Rule (difficult cases)
W 11.3	STR 105	Lab 6	*Mathematica* lab 7: applications of differentiation II
R 11.4	STR 137	(8.5) 1-23	8.3: Newton's Method
M 11.8	STR 137	(8.5) 24-40	8.4: Related rates
T 11.9	STR 137	(8.5) 41-49	Review for Exam 3
W 11.10	STR 105	(8.5) 50-61	*Mathematica* lab 8: Newton's method
R 11.11	STR 137	(8.5) 62-70	**EXAM 3 (covers Chapters 7 and 8)**

DATE	PLACE	DUE	SECTION AND TOPIC
M 11.15	STR 137	Lab 7	9.1: Area and displacement
T 11.16	STR 137		9.2: Riemann sums
W 11.17	STR 105	Lab 8	*Mathematica* lab 9: Riemann sums
R 11.18	STR 137	(9.6) 1-4	9.3: Definition of the Riemann integral
M 11.22	STR 137	(9.6) 5-16	9.4: Properties of integrals
T 11.23	STR 137	(9.6) 17-24	9.5: Fundamental Theorem of Calculus
W 11.24			*No class - Thanksgiving*
R 11.25			*No class - Thanksgiving*
M 11.29	STR 137	Lab 9	9.5: More on the Fundamental Theorem of Calculus
T 11.30	STR 137	(9.6) 25-36	10.1-10.2: Basic integration techniques
W 12.1	STR 105	(9.6) 37-52	*Mathematica* lab 10: integration
R 12.2	STR 137	(10.4) 1-22	10.3: Integration by substitution I
M 12.6	STR 137	(10.4) 23-42	10.3: Integration by substitution II
T 12.7	STR 137	(10.4) 43-62	Review for Exam 4
W 12.8	STR 137	(10.4) 63-69	**EXAM 4 (covers Chapters 9 and 10)**
R 12.9	STR 137	Lab 10	Review for Final Exam
M 12.13.	STR 137		**FINAL EXAM** (cumulative) 10-11:40 AM

How to succeed in this class: I have taught this course many times before and at the end of the class, I often ask students to give advice to students taking the course in the future. Their responses, given below, can be divided into some recurring themes:

1. Attend class and take good notes:
   - Don't miss lectures / show up (x31).
   - Don't fall behind; this class builds on itself (x3).
   - Every class's notes are important.
   - Take good notes in class (x8).
   - Find a friend and take turns taking notes each class.
   - Pay attention in class (x4).
   - Write down everything the professor writes on the board. Reread the notes.
   - Stay on top of every lesson. Understand the lecture notes; don't just write them down.
   - Don't look over notes just before class. Study notes and do problems regularly.
   - Sit where you can see the projector.
   - Spend more time listening to lecture than trying to take notes - you can get the notes from a friend later.
2. Ask questions, and seek help outside of class if necessary:
   - Attend office hours (x28).
   - Ask questions outside of class (x5).
   - Take advantage of the available help. Take advantage of email to ask questions.
   - If something is unclear, ask! (x10)
3. Homework related issues:
   - Keep up with the homework - do all the problems (x24).
   - Make sure to understand how to do the homework problems; don't just copy the answers (x3).
   - Do the homework early, and before you take the quizzes so you have practice (x8).
   - Review constantly (x2).
   - Be organized. Start studying the material early in the course.
   - Homework is important in learning basic skills. You only become good at it with practice.
   - Do the review problems (x2).
4. Other stuff:
   - Memorize everything.
   - Be ready for anything he throws at you / expect everything on the exams (x2).
   - Memorize theorems and definitions (x4).
   - Be prepared for the workload.
   - Review notes before lecture.
   - Look at previous exams on his web page not just the semester before's exams (x6).
   - Study (x3). Study at least 20 minutes a day to keep up on the material.
   - Study up on trig, like "what is $\sin(\frac{\pi}{2})$, $\cos(\frac{\pi}{3})$", etc. He likes to use these on tests and quizzes.
   - Don't freak out.
   - Form study groups. If you need to, get a tutor early on.