Instructor:
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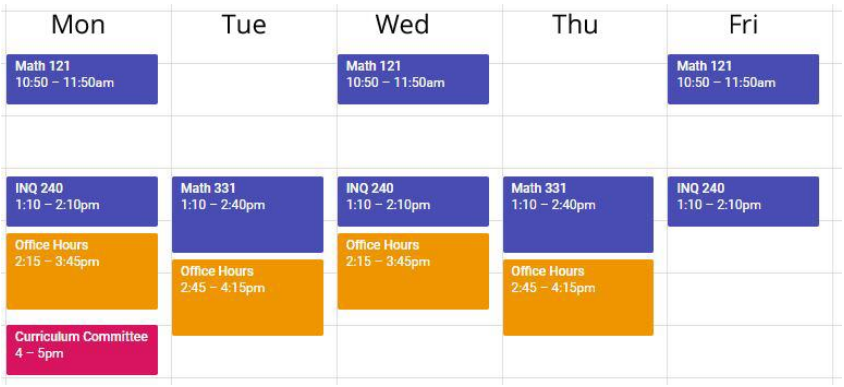
Office Hours:
All office hours are by appointment. To make an appointment, please use the link:

https://drchrislee.youcanbook.me



Overarching Philosophy: Your ability to do Mathematics is not measured by a number stamped on your forehead at birth. Ability is a direct result of effort, and everything in this course is designed to encourage and reward maximum effort. No matter what your ability or grade is at any given moment, it can be changed through focused effort.

Course Description: This course provides and introduction to Calculus, including the study of limits, derivatives, graphing, and beginning integration. A focus of the course will be the use of technology as a tool and learning aid.

Learning Outcomes: By the end of this course, students will be able to:

- apply techniques of differentiation and integration to model and solve problems.
- understand the role of Calculus and the infinitesimal in modern mathematics.
- understand the concepts behind limits, derivatives, and integrals.
- recognize the role of technology in Calculus, understand when it should be used, and be aware of its limitations.

Required Text: Calculus: Early Transcendental Functions; Smith and Minton, 4th Edition

Technology: Laptop running Mathematica recommended

Community: Please feel free to become an active member of our department's community. Each of the three disciplines in our department has a student club and you should join! The Roanoke College Student Chapter of the Mathematical Association of America (or "Math Club" for short) meetings every other week, plays and learns about games and hosts evening events and the annual Pi-Day celebration!

In addition, our department offers MCSP Tea every week on Thursdays from 2:15-3:15pm; come by Trexler 271 to talk to and meet other students as well as chat with the MCSP faculty members in a casual setting!

Attendance: Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. If you accumulate 3 unexcused absences you will be dropped from the class with a grade of DF recorded. When absent, you are responsible for all material covered in class. Missing class has no effect on assignment due dates.

Cell Phones: This is very simple - no cells phones are allowed to be used or even visible in our classroom. This includes before, during, and after class. If a cell phone is seen, the student may be asked to leave the classroom and the day will be counted as an unexcused absence.

Homework: Homework problems will be assigned almost every class period and are due at the start of the next class. Each homework assignment is graded on a 15-point scale as follows:

- 5 pts – one specific problem for correctness, clarity, and thoroughness.
- 5 pts – approximately 7-10 problems graded for effort and completeness
- 5 pts – organization. The graded for correctness problem MUST be on top, all pages stapled, neat, & READABLE.

Technology Assignments: We will be using the powerful software package *Mathematica* throughout class to help
emphasize calculus concepts over needing to compute, say, derivatives and integrals by hand every time we need them. This software will let us spend more time on the "how and why" of calculus and what it can potentially be used for in the future. As part of this class, we will spend a few full days using this technology, done as a combination class discussion, work with a partner, and homework.

Late Work: Unless specific permission is given in advance of the due date, no late work will be accepted.

Grading: Components of a student's grade will be weighted as follows:

Tests: 85% Homework: 10% Technology Assignments: 5%

A scale will for final grades will be not be lower than the scale given below.

0	*60*	*63*	*67*	*70*	*73*	*77*	*80*	*83*	*87*	*90*	*93*
F	*D-*	*D*	*D+*	*C-*	*C*	*C+*	*B-*	*B*	*B+*	*A-*	*A*

Academic Integrity: Students are expected to follow the integrity policy detailed in the handbook *Academic Integrity at Roanoke College*. Additionally, if you are ever uncertain as to how the College's policy pertains to any assignment or exam in this course, please ask me for clarification. The bottom line is that all work that a student submits for a grade must be ***solely*** the work of that student unless the instructor has given explicit permission for students to work together. You will have the opportunity on some quizzes and our main project to collaborate with another as you work in pairs. It is critical that you understand that collaboration means both parties are contributing equally and meaningfully to the assignment. Adding your name to the work of another, as well as using a divide-and-conquer approach, are both examples of seeking credit for work that is not your own.

MCSP Conversations: The MCSP Department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These are known as the talks and lectures in the MCSP Conversation Series. You are invited to be involved with all of these meetings; however, participation **at least two** of these sessions is mandatory. After attending, submit a one-page paper reflecting on the discussion. This should **not** be a regurgitation of the content, but rather a personal contemplation of the experience. These reaction papers will be submitted through Inquire; your final grade will be reduced by 2% if this is not completed.

Testing: We will be making use of **mastery-based testing** rather than a points-based system. Mastery-based testing is very different from what you are used to – do not hesitate to ask me questions.

Description: You only receive credit for answers that demonstrate you completely understand (have mastered) a topic. But, you get many chances to display mastery throughout the semester with no penalty whatsoever for earlier attempts.

- The course has been boiled down to 18 essential types of questions, or "topics".
- Your mastery of questions on these topics is assessed through the working of problem each Friday and during the scheduled final exam period.
- Each problem submitted is graded as either "Mastery" or "Not Mastered". A grade of Mastery indicates that you have demonstrated full understanding of the concept being tested and further work on the topic is not necessary.
- Once you have mastered a problem you need not ever attempt it again.
- There is no penalty whatsoever for multiple attempts taken to achieve mastery.
- Mastery does not mean perfect, it means you understand and can demonstrate all fundamentals of the topic and are proficient at the level desired for the course – you do not need to study the topic further.

Your overall test grade is then determined by the number of topics you have mastered.

#Mastered	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Exam Grade	100	96	92	88	84	80	76	72	68	64	60	56	52	48	40	30	20	10

Notes on Master-Based Testing (in no specific order)

- Clear content objectives, students continually know exactly what they need to work on to improve.
- Credit only for eventual mastery. No partial credit. Multiple attempts with complete forgiveness.
- A points-based system sets arbitrary deadlines by which time perfection must be attained.
- Perseverance: Points – try a problem once, maybe twice, hope for the best.
  Mastery – Keep trying until you succeed (and I know you can)
- Use of feedback: Points – do I agree with the instructors grading
  Mastery – what can I do to demonstrate that I understand the concept (improvement!)
- Reduced Test Anxiety: Points – every test has the potential to damage your GPA.
  Mastery – no one test can harm your grade.
- Intelligent Test Preparation: You may choose to skip problems on a test. Better to achieve mastery on some than to demonstrate mediocrity on all.
- No longer will any of us have to wonder just what exactly a 7/10 means on a problem compared to an 8/10…
- A "broad and superficial" strategy may earn a C or D in a points-based system, in mastery you will fail.

Course Schedule This course expects you to spend at least 12 hours of work each week inside and outside of class.

Wed	Aug 29			Introduction
Fri		Topic 1	1.2	The Concept of Limits
Mon	Sept 3	Topic 1	1.3	Computation of Limits
Wed		Topic 2	1.4	Continuity and Its Consequences
Fri		Topic 3	1.5	Limits Involving Infinity
Mon	Sept 10	Topic 4	2.1, 2.2	Tangent Lines and Velocity / The Derivative
Wed			review	
Fri		**Mastery Day**		
Mon	Sept 17	Topic 5	2.3, 2.4	The Power, Product, and Quotient Rules
Wed		Topic 6	2.5	The Chain Rule
Fri		Topic 7	2.6, 2.7	Derivatives of Trig, Exponential, and Logarithmic Functions
Mon	Sept 24	Topic 8	2.8, 3.8	Implicit Differentiation / Related Rates
Wed		Topic 8	3.8	Related Rates
Fri		**Mastery Day**		
Mon	Oct 1	Topic 9	3.3	Maximum and Minimum Values
Wed		Topic 9	3.4	Increasing and Decreasing Functions
Fri			Technology Day #1	
Mon	Oct 8	Topic 10	3.5, 3.6	Concavity and Curve Sketching
Wed		Topic 11	3.1	Linear Approximations and Newton's Method
Fri		**Mastery Day**		
Fall Break				
Mon	Oct 22	Topic 11	3.2	Indeterminate Forms
Wed		Topic 12	3.7	Optimization
Fri		Topic 12	3.7	Optimization
Mon	Oct 29	Topic 13	4.1	
Wed			review	
Fri		**Mastery Day**		
Mon	Nov 5	Topic 14	4.2, 4.3	Sums / Area
Wed		Topic 14	4.4	The Definite Integral
Fri		Topic 15	4.5	The Fundamental Theorem of Calculus
Mon	Nov 12	Topic 16	4.6	Integration by Substitution
Wed		Topic 16	4.6	Integration by Substitution
Fri		**Mastery Day**		
Mon	Nov 19		Technology Day #2	
Mon	Nov 26		6.2	Integration by Parts
Wed		Topic 17	6.6	Improper Integrals
Fri		Topic 18	5.1	Area Between Curves
Mon	Dec 3		Review	
Wed		**Mastery Day**		
Fri		Course Wrap Up		

Tue	Dec 11	**Mastery Day (Final Exam Block, 8:30-11:30am)**