Ray Tenebruso
850-6000 ext. 125
839-4012 (home)
rtenebruso@madisoncountryday.org
www.math.mnrt.net

Syllabus
Mathematics 12 - Calculus
2011-2012 School Year

Course Description

Here is why this course is worth your effort. If you chose to go on in mathematics or in a mathematically intensive field, calculus is the prerequisite and this is your chance to learn it in the unique environment of MCDS. If you do not go on in mathematics, you will have had a solid and satisfying introduction to an accomplishment of your species that is second to no other human accomplishment.

This course consists of between one and two semesters of college level calculus. We shall begin calculus by considering finite, and then infinite, progressions. This will introduce students to the idea of limit upon which calculus rests. Indeed, calculus may reasonably be considered the study of this idea and its implications. Other important fundamental ideas we will study include continuity and differentiability. We will use calculus to study algebraic, and selected non-algebraic functions such as trigonometric functions, the exponential function, and their inverse functions. We will consider what a function's derivatives tell us about the function's behavior. Students will practice the two general methods of integration which are substitution and integration by parts. Substitutions will include trigonometric substitutions. Applications will be chosen from the sciences and students will find the area of a plane region, volumes of solids and of solids of revolution, the length of a plane curve, moments, and center of mass. Throughout the course, coordinate geometry will be emphasized. Students will be given time to explore and understand the central ideas of calculus even if this results in covering fewer calculus topics.

Students who will take the IB Mathematical Studies Examination will, addition to the above, work a problem set each week on material that will appear on the IB exam. These students will also learn as much about sets, logic, probability, and statistics as is covered on the IB examination; they will write the required IB Internal Assessment paper.

Core Goals

- Acquire understanding of the idea of limit.
- Understand how calculus develops from the idea of limit.
- Acquire technical proficiency in using the basic operations of calculus.
- Apply calculus to a variety of problems chosen from the sciences.

Expectations

Take notes. In mathematics class, every important point is made *both* audibly in spoken words *and* visually in words, symbols, and drawings that go on the board. When you take notes on a solution, derivation, or proof, you think through the mathematics along with your teacher. Taking notes raises your understanding to a higher level, because you interpret, judge, evaluate, and organize what you are seeing and hearing in class while it is happening.

Do homework. Your success in this course depends on your thoughtfully preparing assignments in time for the next class, in which we will discuss your comments and answer your questions about the assignment you completed. Since each class builds upon the previous one, missing an assignment will leave you unable to follow and understand the material presented in the next class. This cascading effect once begun is hard to stop.

Expect to spend about 5 hours per week outside of class seriously working on mathematics without distractions. If you stick to this, you will find you hardly need to study before and exam, because you will already know the material.

Textbook & Resources

Calculus, 8th edition, Varberg, Purcell, Rigdon
Student Solutions Manual for Calculus, 8th edition, Varberg, Purcell, Rigdon
Mathematical Studies, Course Companion, Oxford Press
Exam Preparation & Practice Guide , Haese & Harris Publications

The later two publications are for students who plan on taking the IB Mathematical Studies Examinations.

Web

I maintain a web site at www.math.mnrt.net . This is a valuable resource. If you are absent, you can get the day's assignment and any handouts from class at this site. I update the site every weekday almost always by 5:30 PM.

Here you will find

- the current assignment and all past assignments,
- copies of everything handed out in class including problem sets, and solutions to selected problems, but not including in-class exams and quizzes,
- my notes when the day's topic was especially complex,
- links to sites of mathematical interest.

This is not intended as a substitute for keeping an assignment notebook, which you are required to do. If you are absent from class, check here for the day's assignment and any handouts provided during class. Parents will find the definitive answer to the question: "Do you have any mathematics homework?"

Required Materials

An organized three-ring binder with five divider tabs is required. For students taking the IB Mathematical Studies Exam, an IB approved graphing calculator is required. Students who are not taking this examination will find an inexpensive scientific calculator entirely satisfactory.

Course Outline

- Functions and limits
- Continuity and differentiability
- The derivative
- Applications of the derivative
- The indefinite integral
- The Riemann integral
- Applications of the integral
- Transcendental functions
- Techniques of integration
- Indeterminate forms and improper integral.
- For students taking the Mathematical Studies IB Examination: sets, logic, probability, and statistics.

Grading & Evaluation

Your trimester mastery grade is determined by full period exams, brief quizzes, and any graded assignments. Your scores on quizzes will make up 20% of your trimester grade. Exams and graded assignments will make up 80%. Exams and quizzes will have strict time limits, because they seek to assess your level of proficiency with the material that we recently covered. Proficiency often means that you can work a problem in a couple of minutes using the recent material we covered, rather than suffering 15 minutes of furious labor because you were unfamiliar with the recent material we covered.

It's a fact: homework is the single most important ingredient in determining your grade on examinations and quizzes, and therefore your course grade. If you slack off on homework, you will get a poor course grade.

A quiz may be given at any time without prior announcement. Expect a short quiz about once per week. Your lowest quiz score will be dropped. Exams will be announced well in advance and will require a full class period to complete.

Absence Policy

If you are absent for a quiz or an exam, *you* are expected to arrange to make it up. If you miss a class meeting, borrow another student's notes to copy. Discussing those notes with the other student will further benefit both you and your kind classmate.

Late Work Policy

Homework is considered practice, so you will not be graded on it. There will be some graded assignments including take-home exams. The MCDS High School late work policy will apply to graded assignments. This policy states that for each day work is late, 10% will be deducted from the grade, up to 50%. If the work is never turned in, it will count as zero.

Getting Help

Please seek my help outside of class. I teach because I love to do mathematics with you. The student who makes the extra effort to get help when needed makes a very good impression on

the teacher. Do not expect the impossible, though. If you have not kept up with assignments, meeting with me for an hour as the exam date approaches is not going to do you much good. If that was all it would take for you to do well, I would not be giving all these assignments in the first place. Remember that asking specific questions rather than saying, "I don't get it" will bring you the most useful help as well as evidence the effort you made in trying to master the material.

Students who wish to take the calculus AP exam should inform me of this by September 30, because the exam features several topics that are not treated in a college calculus course.

Signature

I have read and discussed this syllabus with my child _____
Parent's Signature

I have read and discussed this syllabus with my parent(s) _____
Student's Signature