

Course Outline – Mathematics Advanced Calculus Honors – Math 1600

Course Description:

Welcome to Advanced Calculus, it is really great to be back to school for another year. Before starting you are expected to have a thorough knowledge of Algebra, Geometry, and Trigonometry. In fact, you are expected to remember *everything* you have learned in mathematics classes: formulas, rules and theorems. Calculus has always been a very challenging and rewarding experience for students who enjoy math, have a strong background in pre calculus, algebra, geometry, and trigonometry, and are willing to invest the time and effort necessary for success.

Advanced Calculus is essentially the study of change. Calculus answers science's need for solutions to questions of rates of change in population growth, interest income, distance traveled, and more. We will take a team approach to learning the concepts of calculus together using technology as an aid. Relax, enjoy, and work hard, and we will have a fabulous journey to understanding the power of calculus together!

Calculus provides an understanding of the fundamental concepts and methods of differential and integral calculus with an emphasis on their application, and the use of multiple representations incorporating graphic, numeric, analytic, algebraic, and verbal and written responses. Topics of study include: functions, limits, derivatives, and the interpretation and application of integrals. Students should understand that this course is the equivalent of a yearlong, college-level course in single variable calculus.

Course Objectives:

This course is intended to:

- Understand the major topics of functions, limits, derivatives, and integrals.
- Incorporate multiple representations of functions using graphic, numeric, analytic, algebraic, and verbal and written responses, and understand the connections among these representations.
- Construct an understanding of derivatives as an instantaneous rate of change, applications of derivatives as functions, and use various techniques to solve problems including local approximations.
- Understand definite integrals as a limit of Riemann sums, and as the net accumulation of sums, and use them to solve a variety of problems.
- Develop an understanding of the Fundamental Theorem of Calculus as a relationship between derivatives and definite integrals.

- Use graphing calculators or Desmos to problem solve, experiment with ‘what if’ hypotheses, display and interpret results, and justify conclusions.
- Make sense of and determine the reasonableness of solutions including units of measurement.
- Develop an appreciation for an historical perspective of calculus.

Essential Questions:

1. How do you determine the value of a function for a value that is restricted in the domain?
2. What are one-sided limits and infinite limits?
3. What are the methods used to determine limits?
4. How do you calculate the slope of the tangent line to a curve at a point?
5. What is the relationship between differentiability and continuity?
6. What are the rules for finding the derivative of a function using Constant, Power, Sum/Difference, Product/Quotient, and Chain Rules?
7. How do you distinguish between functions written in implicit form and explicit form?
8. How do you find a related rate using differentiation?
9. How do you identify end behavior and function characteristics (including zeros, intercepts, domain and range)?
10. How do you find extrema and inflection points of a function on both an open and closed interval, using first and second derivative tests?
11. What are Rolle’s and Mean Value Theorems?
12. How do you recognize indeterminate form and appropriately use L’Hopital’s Rule?
13. What are extrema and critical points and what do they tell us about a function?
14. What do integrals tell us about a function?
15. Which method for determining definite integrals is most accurate?

Instructor: Mrs. Meyer

Classroom: 804

Schedule:

1. Advanced Calculus Honors - Math 1600
2. Homeroom - Focus
3. Advanced Calculus Honors - Math 1600
4. Conference - Planning
5. Pre Calculus Honors - Math 1410
6. Pre Calculus Honors - Math 1410
7. Advanced Calculus Honors - Math 1600
8. Pre Calculus Honors - Math 1410

Extra Help Hours - Tutoring:

- Community Room
- After School
- Monday – Tuesday – Wednesday – Thursday
- 3:30 pm – 4:30 pm

Contact Information:

- **Phone:** 308 - 324 - 4691
- **Extension:** 2804
- **E-Mail:** sandy.meyer@lexschools.org

Materials:

1. Primary textbook: *Calculus with CalcChat and CalcView 11th Edition*, Ron Larson and Bruce Edwards, Cengage Learning, 2022
2. Graphing calculator or Desmos graphing
3. Pencils, an eraser (*a very large one*), a ruler (preferably a protractor)
4. Graph Paper
5. 3-Ring Binder with dividers
6. 8.5 x 11 loose leaf paper (NO assignments turned in torn from a notebook)

Teaching Strategies:

1. Lecture on concepts and techniques
2. Presentation of examples and strategies
3. Large and small group discussions and explorations
4. Reading and writing assignments
5. Practice and learning through homework assignments
6. Applications to demonstrate relevance and extend learning
7. Active student engagement in group work and discussions
8. Quizzes and tests to encourage and monitor learning

Course Requirements:

1. Regular attendance in class. Arrive prepared and ready to start.
2. Homework primarily self-assessed, completion expected. Students will be assigned daily homework and encouraged to place in proper section of their 3-ring binders. Homework assignments submitted past due date will not be accepted unless under extreme circumstances. Homework quizzes will be given weekly to ensure learning and homework completion.
3. Active participation and engagement in full-class, small-group, and individual activities
4. Quizzes, tests, and final examination. At least one-week notice will be given for tests and quizzes. There will be no make up quizzes or test unless the instructor is informed in advance and an acceptable written note is provided with a justification for the absence. There will be no test revisions.
5. Notebook: Students are strongly encouraged to take notes during class with the notes complete and in an orderly manner. Date the material. There is a rubric for the grade on your notebook.
6. Pencil and eraser: Ink is not allowed on any assignment or test.

Homework:

Students are encouraged to complete all homework problems soon after the section is discussed in class. Questions for the quiz every other week will for the most part be based on these

problems. The instructor may also collect particular homework assignments in order to provide constructive feedback to the students and to verify that students are making reasonable progress on these assignments. Students are encouraged to discuss homework questions with the instructor and other students. The work submitted should be your own and all steps for a problem must be shown. Answers alone will not be acceptable. A limited amount of time at the beginning of each class will be allocated for discussion of homework problems.

Though the assignments will vary according to the material, the general form for homework will be as follows: You will be assigned a set of problems each to complete. From these I will select a small number of problems (typically no more than 10) that you must prepare fully and turn in to me the following day. **"Prepare Fully" means that you must write out the full problem - yes, directions included - neatly with a step-by-step explanation of the solution.** *As with most math homework, the answers are not that important; you doing the work and understanding the concept are. In fact, the problems will generally be odd numbered so you may check your solution in the back.*

Quizzes:

Quizzes will be given every week (except on a test day), and will be equivalent to 35% of your final grade. Make-up quizzes under extreme circumstances will be allowed. These will be taken after school only. There are no retakes.

Tests - Exams:

There will be two to three exams per marking period. The exams are composed of multiple choice and free-response questions. Tests will count 45% of your grade. There are no retakes.

Classroom Policies:

1. Active participation requires attendance and arrival to class in time to be prepared for work when the class period begins. Students arriving late on the day of a quiz or test will not be given extra time.
2. Respect your classmates as well as your instructor. Discussion in class will pertain to the topic of the course. All students have a right and responsibility to ask questions and give insight related to the understanding of course content. Students having a large number of questions should consult the instructor outside of class.
3. Participation in large and small group discussions is required and assessed for active engagement and contribution.
4. All work turned in on tests, quizzes, and individual papers must be entirely your own. Behavior contrary to this will result in a grade of F on the assignment. On homework, acknowledge any ideas you received from others. Students should be aware of and adhere to the policy on plagiarism.
5. You are encouraged to study together outside of class. The work you turn in should be entirely your own, though. If you receive help in completing the homework, make sure you put away any notes, write the answer in your own words, and give credit to your collaborators.
6. Take responsibility for your own learning. Share your strategies/questions with the aim of having others understand what you are getting at and where/why you are stuck. This

- is different from “I couldn’t get ...” and expecting another student to show you their answer.
7. Your full attention is expected on a daily basis and will be necessary in order to keep pace with the class. Sleeping or putting your head down will not be permitted!
 8. Do not ask to leave the classroom unless absolutely necessary. Take care of water and restroom visits between classes. Students should also plan other stops at times, which do not cause them to be tardy.
 9. Only bottled water is allowed in class. This will only be allowed as long as students dispose of trash properly and keep the classroom clean. Do not bring outside purchases, such as breakfast items or coffee, in my classroom.
 10. Have fun, but stick to the task.

Advanced Calculus Topic List:

Functions, Graphs, and Limits

- Limits of functions (including one-sided limits)
- Asymptotic and unbounded behavior
- Continuity as a property of functions

Derivatives

- Concept of the derivative
- Derivative at a point
- Derivative as a function
- Second derivative
- Applications of derivatives
- Computation of derivatives

Integrals

- Interpretations and properties of definite integrals
- Applications of integrals
- Fundamental Theorem of Calculus
- Techniques of antiderivatives
- Applications of antiderivatives
- Numerical approximations to definite integrals

Major areas to be taught include *Functions, Graphs, and Limits; Derivatives; Integrals (both indefinite and definite); Logarithmic, Exponential, and Other Transcendental Functions; and Applications of Integrations*. Problems and their solutions will be approached from a graphical, numerical, and analytical perspective, with emphasis on how these representatives are related. Throughout the course, students will concentrate on the importance of communication in their approach to understanding the problems, working through their solutions, and being able to present their solutions and rationale to classmates.

Grading Policy:

Criteria for computing grades: Weight

| | |
|---|-----|
| Tests / Exams | 45% |
| Quizzes | 35% |
| Homework Quizzes, Homework Assignments, NEAT Notebook | 20% |

Semester Grade: Weight

| | |
|---------------|-----|
| Quarter 1 & 3 | 45% |
| Quarter 2 & 4 | 45% |
| Semester Test | 10% |

In accordance with school policy, letter grades for the quarters, exams, and semesters will follow the familiar grade scale. All grades for the quarter will be calculated based on the below percentages.

| | | | |
|------------------|---|----------------|---|
| 93 – 100 % | A | 0 – 69 % | F |
| 85 - 92 % | B | | |
| 77 - 84 % | C | | |
| 70 - 76 % | D | | |

Cell Phones:

Use of cell phones/smart watches or other electronic devices is NOT allowed in my classroom. Your phone/device must be completely silenced and put away (out of my sight and yours) as soon as you enter my classroom. Since book bags are left in the hallway, it is best to leave your cell phone there also. You may not take pictures or videos (of anything or anyone) without my permission. If you violate this policy your phone will be collected following the rules from the administration. There will be no warnings. You already had your first warning on the first day of school in the gym from the administration.

How to Study Math:

- Take good notes.
- Review notes after class.
- Read the text.
- Get a study buddy.
- Have a scheduled time to do your math homework (as soon after class as possible).
- Set aside time to study for tests and quizzes. Don't wait until the last minute.
- Always come to class with a positive attitude and ready to learn something new. Please don't wait until you are falling behind before asking for help, if you don't understand something, ask questions ... that's what I'm here for!

LHS Academic Honesty Requirement:

Academic Dishonesty will not be tolerated and will result in automatic failure of Exam/Quiz/Project and disciplinary action will be taken.

Talking about math problems with your classmates is an important part of the learning process. Therefore, I will allow responsible communication about homework and problem sets outside of the classroom. This is not a license to cheat. You may only work to help one another. You may not copy all of your friend's homework solutions before class. This is not help for your friend or yourself; it will result in no credit on an assignment.

Obviously, the above policy does not apply for quizzes or tests. Any correspondence during these assignments will be considered cheating and will result in a zero on the assignment and parents will be contacted.

Important rules for the classroom:

1. No student will be allowed into the classroom without an ID lanyard around his or her neck and it will remain visible all class period.
2. If you are absent, you are responsible to get any work you missed in class (check the Google Classroom) and bring to class with in two days. If you will be absent for a school activity, talk with the instructor as to what the plan will be.
3. No late work will be accepted. You must be aware of the due dates and turn the assignment in on time. No excuses will be accepted except in extreme situations.
4. Please do not ask to go to counselors, other teachers, or an administrator during my class, as it is important that you are in class so you do not miss important information. Please make arrangements to do any of your business on your time.
5. Please copy and paste this page to a word document, sign, have your parents/guardians sign and return to me by Friday, August 20th.

I have read and understand the course information presented on this syllabus as well as the Lexington High School Academic Policy. My child is expected to be responsible and keep on top of the required assignments and I will see that they are prepared and I will make sure they have what is necessary to succeed.

Student Signature: _____

Parent / Guardian Signature: _____

Date: _____