

MA 123: Elementary Calculus and its Applications

Welcome to Math 123! This course is an introduction to differential and integral calculus, with applications to business and the biological and physical sciences. We cover differentiation of rational, radical, and exponential functions, integration as area, and using the fundamental theorem of calculus to integrate certain elementary functions. We cover applications to increasing and decreasing functions, concavity, optimization, and related rates.

This website contains almost all the information you will need this semester, including the official text for the course, contact information for your instructors, policies for grades and absences, worksheets used during recitations, important dates and deadlines, and more.

Texts:

The **Course Text** given on this website is the primary means of instruction for the course. These notes are largely based on the optional text **Calculus** by Elliot Gootman. Gootman's text is very readable and has many worked out examples, and often provides more detail than the lecture notes available here.

Goals:

This course will cover the topics from the first ten chapters and supplement of the **Course Text**. All of these topics are covered in the online homework sets.

Upon successful completion of the course, the student should be able to

1. Evaluate limits of functions given graphically or algebraically;
2. Compute derivatives of algebraic, logarithmic and exponential functions, and combinations of these functions; Interpret the derivative as a rate of change, and solve related application problems;
3. Use the first and second derivatives to analyze the graphs of functions, to find the maximum and minimum values of a function, and to solve related application problems;
4. Interpret the definite integral in terms of area, and solve related application problems;
5. Integrate selected functions, and apply the fundamental theorem of calculus to evaluate definite integrals.

Prerequisites:

You should have a strong understanding of college algebra. Specifically, you should have a Math Index of 74 or above, or a Math ACT score of at least 26, or a Math SAT or 600 or above, or a grade of C or better in Math 109,

or consent of the department. If you have a weak algebra background it is essential that you immediately brush up on this prerequisite. Most students who do not do well in calculus find that the required algebra is a major roadblock.

Helpful resources if you need to brush up on algebra, geometry, or arithmetic:

- **OpenStax College Algebra** A free, online open source textbook on College Algebra available through OpenStax.
- **Stitz and Zeager's College Algebra** A free open source College Algebra text. **Print versions** also available for a small fee.
- **The Khan Academy** Free video lectures on many mathematical topics.

Policies

Grading:

Your grade will be calculated out of a total of 565 points, earned as follows:

Exam 1: 100 points

Exam 2: 100 points

Exam 3: 100 points

Exam 4: 100 points

Homework: 100 points

Recitation: 40 points

Lecture: 25 points

The homework score will be computed as follows. There are more than 265 homework problems in the course, but the homework grade will be based on your best 265 problems, with only 240 required for full credit. Thus, if you answer X homework problems correctly, your homework score will be $X/240$ times 100. If you answer more than 240 problems correctly you will earn bonus points; the maximum allowed score is 110. (Technically, if you answer X homework problems correctly, your homework score will be $(\min(X,265)/240)$ times 100).

Your final grade for the course will be based on the total points you have earned as follows.

A: 508-565

B: 452-507

C: 395-451

D: 339-394

E: 0-338

Recitation:

The recitation/participation points will be awarded for actively engaging in discussions in recitation, performance on worksheets, and performance on quizzes. Each recitation instructor will provide a handout on the first day explaining the policies and grading specific to their sections.

Lecture:

The lecture portion of your grade is based on active participation in lecture (the Mon-Wed-Fri meetings). You will participate in class using your phone, laptop, or other device with an internet connection. You will need to create an iClicker REEF polling Student account and purchase a subscription. When setting up your account, please use your student ID number without the leading 9, and your official UK email address. A 180-day subscription costs \$14.99, and can be purchased directly through REEF or by buying an access code from one of the university bookstores. If you have any difficulties with obtaining an account or with bringing a phone or laptop to class, please see your instructor. If you are using iClicker REEF Polling in another class this term, you only need one subscription. You can access our iClicker REEF course by using the REEF Polling link on the Modules tab of our Canvas course page. **[For more information about REEF Polling click here.](#)** See below for information about absences from lecture.

Excused Absences:

Excused absences are granted according to **University Senate Rule 5.2.4.2**, which defines the following as acceptable reasons for excused absences: serious illness; illness or death of family member; University-related trips; major religious holidays; other circumstances your instructor finds to be "reasonable cause for nonattendance".

The procedure for handling an absence varies based on whether you are missing an exam, a lecture class, or a recitation class.

Missing an exam:

Absences from exams should be **reported (in advance) on this form**. Students who have university excused absences or who have university-scheduled class conflicts with uniform examinations need to make arrangements to take exam at an alternate time. According to **university policy**, it is the student's responsibility to resolve scheduling conflicts with common hour exams, and this must be done at least TWO WEEKS before

the exam. If you fail to inform your instructor of exam conflicts in timely manner, a penalty may be assessed on your exam score and you will be required to take the exam at one of the already scheduled alternate exam times. To avoid any problems request alternate exams here as soon as you know you may have a conflict.

Missing a lecture class:

For lecture attendance, your clicker grade will automatically allow you to have up to five excused absences without providing any documentation. If you are absent, please collect your documentation in a safe place and keep careful count. **If you accumulate six or more EXCUSED absences from lecture, you should provide official documentation for ALL of the absences to your lecturer within one week of the sixth excused absence (and for any absence thereafter).**

Missing a recitation class:

Recitation attendance is required. Because recitation meets only once a week, you should make every effort to attend. For policies about handling excused absences, see your recitation instructor for details. Contact information is on the Sections and Instructors page. Generally, you will be required to make up the work you miss in a timely fashion.

Calculator Policy:

During exams, we allow the same calculators as the ACT allows; no Computer Algebra System (CAS), no network (data or wifi), no camera. Absolutely no cell phone use during an exam is allowed. A good scientific calculator will be sufficient, as long as it has exponential and ln functions; occasionally a graphing calculator (such as a TI-84) may be helpful but is not required. It is recommended that you practice with whatever calculator you plan to use during the exams.

Disability Accommodations:

If you have documented disability that requires academic accommodations, please see your lecturer as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide a Letter of Accommodation from the Disability Resource Center (Suite 407, Multidisciplinary Science Building, 859-257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Academic Integrity, Honesty, and Cheating:

You should feel free to study with friends, but any work you submit for a grade should be your own work. This applies to all exams, quizzes, and writing assignments, with the exception of assignments that are specifically designated as group assignments. Academic dishonesty, in any form, will not be tolerated. This includes, but is not limited to, having someone else bring your clicker to class, using multiple people's clickers during class, copying a classmate's work, allowing a classmate to copy your work, having someone else turn in a quiz for you, turning in a quiz for someone who was not there, modifying an exam after it has been handed back in an attempt to deceive the instructor into believing the assignment was graded incorrectly, using cell phone during an exam. A student found guilty of academic dishonesty will receive an automatic E on the assignment, and in some cases the offense may lead to an E for the course, academic probation, or even expulsion. See sections 6.3.1 and 6.3.2 of the University Senate Rules for more information regarding academic integrity.

Classroom decorum and civility:

Students are expected to be actively participating during class. Students are also expected not to distract others. If you arrive late, leave early, are distracted by your phone, or are otherwise not actively engaged with the class you may not receive credit for participating that day. If you are disrupting class, you may be asked to leave.

College-level mathematics can be very difficult, and many of your classmates will be having a hard time adjusting both to the university and to the demands of the class. You are expected to treat your classmates with respect. It is reasonable to disagree, but you should express your disagreement respectfully. Personal attacks or statements denigrating another on the basis of race, sex, religion, sexual orientation, gender or gender expression, age, national/regional origin or other such irrelevant factors are considered a severe disruption. Harassment will not be tolerated.

Non-Discrimination Statement and Title IX Information:

The University of Kentucky faculty are committed to supporting students and upholding the University's non-discrimination policy. Discrimination is prohibited at UK. If you experience an incident of discrimination we encourage you to report it to Institutional Equity & Equal Opportunity (IEEO) Office, 13 Main Building, (859) 257-8927.

Acts of Sex- and Gender-Based Discrimination or Interpersonal Violence: If you experience an incident of sex- or gender-based discrimination or interpersonal violence, we encourage you to report it. While you may talk to a faculty member or TA/RA/GA, understand that as a "Responsible Employee" of the University these individuals MUST report any acts of violence (including verbal bullying and sexual harassment) to the University's Title IX Coordinator in the IEEO Office. If you would like to speak with someone who may be able to afford you

confidentiality, the **Violence Intervention and Prevention (VIP) program** and **Bias Incident Support Services** (Frazee Hall – Lower Level), the **Counseling Center** (106 Frazee Hall), and **University Health Services** are confidential resources on campus.

Corrections to ewhitaker@uky.edu.

MA123 Important Dates

Wednesday, August 23	First day of classes
Tuesday, August 29	Last day to add a class
Monday, September 4	Labor Day (no classes)
Wednesday, September 13	Last day to drop a class without receiving a grade
Thursday, September 21	Exam 1, 5:00pm - 7:00pm
Thursday, October 19	Exam 2, 5:00pm - 7:00pm
Friday, November 10	Last day to withdraw from a class
Thursday, November 16	Exam 3, 5:00pm - 7:00pm
Wednesday, November 22 - Friday, November 24	Thanksgiving Break (no classes)
Friday, December 8	Last day of classes
Tuesday, December 12	Exam 4, 6:00pm - 8:00pm

Tentative Course Schedule - MWF Classes

Date	Description
Wednesday, August 23	Introduction/ Algebra Review (Chapter 1)
Friday, August 25	Algebra Review (Chapter 1)
Monday, August 28	Rates of Change (Chapter 2)
Wednesday, August 30	Rates of Change (Chapter 2)
Friday, September 1	Rates of Change (Chapter 2)
Monday, September 4	Labor Day (no class)
Wednesday, September 6	Limits (Chapter 3)
Friday, September 8	Limits (Chapter 3)
Monday, September 11	Limits (Chapter 3)
Wednesday, September 13	Computing some Derivatives (Chapter 4)
Friday, September 15	Computing some Derivatives (Chapter 4)
Monday, September 18	Computing some Derivatives (Chapter 4)
Wednesday, September 20	Review for Exam 1
Thursday, September 21	Exam 1: 5:00pm - 7:00pm
Friday, September 22	Formulas for Derivatives (Chapter 5)
Monday, September 25	Formulas for Derivatives (Chapter 5)
Wednesday, September 27	Formulas for Derivatives (Chapter 5)
Friday, September 29	Exponential and Logarithmic Functions (Supplement)
Monday, October 2	Exponential and Logarithmic Functions (Supplement)
Wednesday, October 4	Exponential and Logarithmic Functions (Supplement)
Friday, October 6	Related Rates (Chapter 7a)

Monday, October 9	Related Rates (Chapter 7a)
Wednesday, October 11	Extreme Values(Chapter 6)
Friday, October 13	Extreme Values (Chapter 6)
Monday, October 16	Curve Sketching and Concavity (Chapter 6)
Wednesday, October 18	Review for Exam 2
Thursday, October 19	Exam 2: 5:00pm - 7:00pm
Friday, October 20	Curve Sketching and Concavity (Chapter 6)
Monday, October 23	Curve Sketching and Concavity (Chapter 6)
Wednesday, October 25	Curve Sketching and Concavity (Chapter 6)
Friday, October 27	Optimization (Chapter 7b)
Monday, October 30	Optimization (Chapter 7b)
Wednesday, November 1	The Idea of the Integral (Chapter 8)
Friday, November 3	The Idea of the Integral (Chapter 8)
Monday, November 6	The Idea of the Integral (Chapter 8)
Wednesday, November 8	Estimating Definite Integrals (Chapter 9)
Friday, November 10	Estimating Definite Integrals (Chapter 9)
Monday, November 13	Estimating Definite Integrals (Chapter 9)
Wednesday, November 15	Review for Exam 3
Thursday, November 16	Exam 3: 5:00pm - 7:00pm
Friday, November 17	Fundamental Theorem of Calculus; Antiderivatives (Chapter 10)
Monday, November 20	Fundamental Theorem of Calculus; Antiderivatives (Chapter 10)
Wednesday, November 22	Thanksgiving Break (no class)
Friday, November 24	Thanksgiving Break (no class)
Monday, November 27	Fundamental Theorem of Calculus; Antiderivatives (Chapter 10)
Wednesday, November 29	Fundamental Theorem of Calculus; Antiderivatives (Chapter 10)
Friday, December 1	Fundamental Theorem of Calculus; Antiderivatives (Chapter 10)
Monday, December 4	Course Review
Wednesday, December 6	Course Review
Friday, December 8	Course Review
Tuesday, December 12	EXAM 4, 6:00pm - 8:00pm

MA123 Fall 2017 sections and instructors

Instructor's Name	Sections (#, time, location)	E-mail Address
Luvreet Sangha	2-6 MWF 8:00 am - 8:50 am - CB 118	luvreet.sangha@uky.edu
Joseph Dillstrom	002 Th 8:00 am - CP 397	jdillstrom@uky.edu
Joseph Dillstrom	003 Tu 9:30 am - CB 245	jdillstrom@uky.edu
Joseph Dillstrom	004 Th 9:30 am - CB 245	jdillstrom@uky.edu
Jinping Zhuge	005 Tu 11:00 am - CB 243	jinpings.zhuge@uky.edu
Matias von Bell	006 Th 11:00 am - CB 243	matias.vonbell@uky.edu
Nathan Druivenga	7-12 MWF 10:00 am - 10:50 am - CP 139	nathan.druivenga@uky.edu
Joseph Dillstrom	007 Tu 8:00 am - CP 297	jdillstrom@uky.edu
Jinping Zhuge	008 Th 8:00 am - CP 297	jinpings.zhuge@uky.edu
Jinping Zhuge	009 Tu 9:30 am - CB 346	jinpings.zhuge@uky.edu
Jinping Zhuge	010 Th 9:30 am - CB 346	jinpings.zhuge@uky.edu
Matias von Bell	011 Tu 11:00 am - CB 231	matias.vonbell@uky.edu
Kaelin Cook-Powell	012 Th 11:00 am - CB 231	kaelin.cook-powell@uky.edu
Nathan Druivenga	13-18 MWF 11:00 am - 11:50 am - CP 139	nathan.druivenga@uky.edu
Matias von Bell	013 Tu 12:30 pm - CB 231	matias.vonbell@uky.edu
Matias von Bell	014 Th 12:30 pm - CB 231	matias.vonbell@uky.edu
Kaelin Cook-Powell	015 Tu 2:00 pm - CB 336	kaelin.cook-powell@uky.edu
Devin Willmott	016 Th 2:00 pm - CP 208	devin.willmott@uky.edu
Devin Willmott	017 Tu 3:30 pm - CB 333	devin.willmott@uky.edu
Devin Willmott	018 Th 3:30 pm - CB 333	devin.willmott@uky.edu
erica Whitaker	19-24 MWF 12:00 pm - 12:50 pm - CP 139	ewhitaker@uky.edu
Kaelin Cook-Powell	019 Tu 12:30 pm - FB B8	kaelin.cook-powell@uky.edu
Kaelin Cook-Powell	020 Th 12:30 pm - FB B8	kaelin.cook-powell@uky.edu
Kyle Franz	021 Tu 2:00 pm - CB 303	kyle.franz@uky.edu
Kyle Franz	022 Th 2:00 pm - CB 303	kyle.franz@uky.edu
Yanxi Li	023 Tu 3:30 pm - POT OB7	yanxi.li@uky.edu
Kyle Franz	024 Th 3:30 pm - CB 303	kyle.franz@uky.edu
Katherine Paullin	25-30 MWF 2:00 pm - 2:50 pm - CP 139	katherine.paullin@uky.edu
Kyle Franz	025 Tu 12:30 pm - CB 235	kyle.franz@uky.edu
Yanxi Li	026 Th 12:30 pm - CB 235	yanxi.li@uky.edu
Devin Willmott	027 Tu 2:00 pm - CB 346	devin.willmott@uky.edu
Yanxi Li	028 Th 2:00 pm - CB 346	yanxi.li@uky.edu
Yanxi Li	030 Th 3:30 pm - POT OB7	yanxi.li@uky.edu

MA123 Course Text

Detailed notes with the plan for each chapter (goals, main facts and problems to be discussed in class) have been written in order to assist you throughout the course. They will be used as a primary means of instruction. Your instructor may use exactly these examples, or may use similar examples so that you can review these as additional examples.

This course has about 160 pages of lecture notes and recitation worksheets. These pages can be printed on campus printers for about 12 cents per page, (see [UK's IT site](#) for current pricing information) which would total a bit less than \$20. You might prefer to consider the following other alternatives:

1. You can use your private printer to print the pages.
2. You can view the notes on your own computer.

We recommend that you review the lecture notes before or after class. It is best to treat the original copy as a worksheet, fill in what answers you can, and only consult the versions with answers to check your work or if you get stuck.

The chapters below also include links to some video lectures. Some of these can be very helpful; others are a bit out of date and may represent material that is no longer covered in the course. If you are unsure whether a particular resource or question is important, please contact your instructor.

Chapter 1:

Equations, functions and graphs

[lecture notes](#)

[notes with answers](#)

[notes with color answers](#)

[Video lectures](#)

Chapter 2:

Change, and the idea of derivative

[lecture notes](#)

[notes with answers](#)

[notes with color answers](#)

[Video lectures](#)

Chapter 3:

The idea of limits

[lecture notes](#)

[notes with answers](#)

[notes with color answers](#)

[Video lectures](#)

Chapter 4: Computing some derivatives

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 5:

Formulas for derivatives

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Supplement:

Exponential and logarithmic functions

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 6:

Extreme values, the Mean Value Theorem, and curve sketching

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 7a:

Related Rates

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 7b:

Optimization

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 8:

Idea of the integral

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 9:

Estimating definite integrals

[lecture notes](#) [notes with answers](#) [notes with color answers](#) [Video lectures](#)

Chapter 10: Integrals, antiderivatives, and the Fundamental Theorem of Calculus

MA123 Recitation Worksheets

You are required to attend a recitation section. In Math 123, recitations serve as a kind of lab; they are an opportunity to look at problems more in-depth than we sometimes have time to in lecture, and to take quizzes or do other graded work.

(See the [Sections and Instructors page](#) to look up your recitation according to your section number.)

Talk to your recitation instructor to find out policies and procedures specific to your section. Material for recitations will include the worksheets below.

Tentative Recitation Schedule

Recitation Packet through Exam 1

Recitation Packet through Exam 2

Recitation Packet through Exam 3

Recitation Packet through Exam 4

MA123 Online homework

Homework is turned in on WeBWork, our online homework system. To access WeBWork go to the Modules tab of our Canvas page and select "Webwork for UK MA 123 Fall 2017." We recommend using Chrome or Firefox as the web browser.

You have unlimited tries up until the due date, and you may keep working late into the night indicated. For each homework deadline below, the homework will close at 8am the next morning.

Due Date	Homework
Tuesday, August 29	HW 01: Algebra Review
Thursday, August 31	HW 02: Rates of Change (1)
Tuesday, September 5	HW 03: Rates of Change (2)
Thursday, September 7	HW 04: Limits (1)
Tuesday, September 12	HW 05: Limits (2)
Thursday, September 14	HW 06: Computing Derivatives (1)
Tuesday, September 19	HW 07: Computing Derivatives (2)
Thursday, September 21	Exam 1: 5:00pm - 7:00pm
Tuesday, September 26	HW 08: Formulas for Derivatives (1)
Thursday, September 28	HW 09: Formulas for Derivatives (2)
Tuesday, October 3	HW 10: Exponential and Logarithmic Functions
Thursday, October 5	HW 11: Review of Derivative Formulas
Tuesday, October 10	HW 12: Exponential Growth and Decay
Thursday, October 12	HW 13: Related Rates
Tuesday, October 17	HW 14: Extreme Values
Thursday, October 19	Exam 2: 5:00pm - 7:00pm

Tuesday, October 24	HW 15: Curve Sketching
Thursday, October 26	HW 16: Concavity
Tuesday, October 31	HW 17: Optimization
Thursday, November 2	HW 18: Idea of the Integral (1)
Tuesday, November 7	HW 19: Idea of the Integral (2)
Thursday, November 9	HW 20: Estimating Definite Integrals (1)
Tuesday, November 14	HW 21: Estimating Definite Integrals (2)
Thursday, November 16	Exam 3: 5:00pm - 7:00pm
Tuesday, November 28	HW 22: Fundamental Theorem of Calculus (1)
Thursday, November 30	HW 23: Fundamental Theorem of Calculus (2)
Tuesday, December 5	HW 24: Fundamental Theorem of Calculus (3)
Tuesday, December 12	Exam 4: 6:00pm - 8:00pm

MA123 Exam information

Each exam is worth 100 points. You must bring a photo ID to each exam and you may use a calculator on the exams. We allow the same calculators as the ACT allows; no Computer Algebra System (CAS), no network (data or wifi), no camera. Absolutely no cell phone use during an exam is allowed. The final exam, Exam 4, will be comprehensive.

Exams from previous semesters are posted here.

Click here for the room schedule for exams 1-3 and the final exam.

Exam dates and material

MA123 has common hour exams, including its final exam.

Exam 1: 5:00pm - 7:00pm, Thursday, September 21.

Covers homework sets 01 - 07 and chapters 1, 2, 3, and 4.

Exam 2: 5:00pm - 7:00pm, Thursday, October 19.

Covers homework sets 08 - 14 and chapter 5, supplement, related rates, and up through example 8 in chapter 6.

Exam 3: 5:00pm - 7:00pm, Thursday, November 16.

Covers homework sets 15 - 21 and chapters 6, 7, 8, 9.

Exam 4: 6:00pm - 8:00pm, Tuesday, December 12.

Covers all homework sets and all chapters.

After an exam is given, you should go back over the exam and redo problems you got wrong. Due to the cumulative nature of this course, failure to remedy any deficiencies in your understanding will haunt you later in the semester.

Alternate exams

Students who have university excused absences or who have university-scheduled class conflicts with uniform examinations may take the Alternate Exam. You must fill out the Alternate Exam Request Form and submit it to your instructor at least two weeks before the scheduled exam. Click here for instructions on filling out the alternate exam form.

Room Schedule for Exams 1-3

Section(s)	Exam Room
002	<u>CB 114</u>
003	<u>CB 114</u>
004	<u>CB 106</u>
005	<u>CB 106</u>
006	<u>CP 153</u>
007	<u>CB 106</u>
008	<u>JSB 321</u>
009	<u>JSB 321</u>
010	<u>JSB 321</u>
011	<u>KAS 213</u>
012	<u>CB 110</u>
013	<u>KAS 213</u>
014	<u>KAS 213</u>
015	<u>CB 110</u>
016	<u>BS 107</u>
017	<u>BS 107</u>
018	<u>BS 107</u>
019	<u>CB 106</u>
020	<u>CB 106</u>
021	<u>FB 200</u>
022	<u>FB 200</u>
023	<u>CP 153</u>
024	<u>FB 200</u>
025	<u>BS 107</u>
026	<u>CB 122</u>
027	<u>BS 107</u>
028	<u>CB 122</u>
030	<u>CP 153</u>

Regular midterm exams and final exam

Exams	Date	Time
Exam 1	Thursday, September 21	5:00pm - 7:00pm
Exam 2	Thursday, October 19	5:00pm - 7:00pm
Exam 3	Thursday, November 16	5:00pm - 7:00pm
Exam 4	Tuesday, December 12	6:00pm - 8:00pm

Click [here](#) for instructions for filling out the alternate exam request form.

Exams from previous semesters are posted [here](#).