

# MA 137 - Calculus 1 with Life Science Applications Syllabus & Course Policies (Spring 2018)

## Time & Location:

Lectures: MWF 11:00-11:50 am, CB 110 (sections 001-004)  
Recitations: TR 08:00-08:50 am, CB 339 (section 001)  
TR 09:00-09:50 am, CB 339 (section 002)  
TR 12:00-12:50 pm, CB 339 (section 003)  
TR 1:00-1:50 pm, CB 339 (section 004)

## Instructors:

Lecturer: **David Murrugarra**, POT 771, (859) 257-4734, murrugarra@uky.edu  
(sections 001-004)  
Office hours: MW 3:00-4:00 pm, Tuesdays 11:00 am-12:00 pm, and by appointment

Teaching Assistants: **Karthik Chandrasekhar**, POT 718, (859) 257-6816, ak.c@uky.edu  
(sections 001, 002)  
Office hours: TR 10:00-11:00 am; Friday, 2:00-3:00 pm in the Mathskeller, and by appointment

**Shane Clark**, POT 702, (859) 257-6804, shane.clark@uky.edu  
(sections 003, 004)  
Office hours: Tuesday/Thursday 10-11 am (POT 722), Tuesday 9-10 am (Mathskeller), and by appointment

## Course Description for MA 137 (4 credits):

A first course in one-variable calculus. Derivatives and integrals of elementary functions (including trigonometric functions) with applications to the life sciences. Lecture, three hours; recitation, 2 hours per week. Students may not receive credit for MA 113 and MA 137.

**Prereq:** Math ACT of 27 or above, or math SAT of 620 or above, or a grade of C or better in MA 109 and MA 112, or a grade of C or better in MA 110, or appropriate scores score on math placement test, or consent of the department. Students who enroll in MA 137 based on their test scores should have completed a year of pre-calculus study in high-school that includes the study of the trigonometric functions.

**Note:** Math placement test recommended.

*[Per Senate Rule 4.3.3, students will not be permitted to register for this course for a fourth*

time. To request an exception to this rule, visit <https://math.as.uky.edu/lower-level-math-overrides>.]

## **Course Outline:**

We begin by introducing the notion of a limit, both for sequences and for function of a real variable. Limits are essential to defining derivatives and integrals. By the end of the semester students should know precise definitions of the derivative and the integral and understand the fundamental theorem of calculus which gives the relation between the derivative and the integral. We will illustrate the methods and ideas of calculus by studying several problems from biology. We will study the interpretation of the derivative as a rate of change, and model growth and declines of populations.

### **1. Chapter 1: Preview and review**

Preliminaries, elementary Functions, and graphing

### **2. Chapter 2: Discrete time models, sequences, and difference equations**

Exponential growth and decay

Sequences

More population models

### **3. Chapter 3: Limits and continuity**

Limits

Continuity

Limits at infinity

The Sandwich Theorem and some trigonometric limits

Properties of continuous functions

### **4. Chapter 4: Differentiation**

Formal definition of the derivative

The power rule, the basic rules of differentiation, and the derivatives of polynomials

The product and quotient rules, and the derivatives of rational and power functions

The chain rule and higher derivatives

Derivatives of trigonometric functions

Derivatives of exponential functions

Derivatives of inverse and logarithmic functions

Approximations and local linearity

## 5. Chapter 5: Applications of differentiation

Extrema and the Mean Value Theorem

Monotonicity and Concavity

Extrema, inflection points, and graphing

Optimization

L'Hospital's rule

Difference equations: stability

Antiderivatives

## 6. Chapter 6: Integration

The definite integral

The Fundamental Theorem of Calculus

Applications of integration

### Student Learning Outcomes:

After completing this course, students will be able to:

1. apply the methods of calculus in new contexts to solve unfamiliar problems;
2. compute fluently;
3. write correct justifications for their solutions to problems.

### Grading:

You will be able to obtain a maximum of 500 points in this class, divided as follows:

	Points	Percentage of final grade
<b>Exam 1</b>	100 points	20%
<b>Exam 2</b>	100 points	20%
<b>Exam 3</b>	100 points	20%
<b>Final</b>	100 points	20%
<b>Homework</b>	40 points	8%
<b>Lecture</b>	20 points	4%
<b>Recitation</b>	20 points	4%
<b>Final project</b>	20 points	4%

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

	Points	Percentage
<b>A</b>	450 - 500 points	90 - 100 %
<b>B</b>	400 - 449 points	80 - 89.9 %

<b>C</b>	350 - 399 points	70 - 79.9 %
<b>D</b>	300 - 349 points	60 - 69.9 %
<b>E</b>	0 - 299 points	0 - 59.9 %

The grading scale might be adjusted at the end of the semester. You will be guaranteed the above letter grade if your score falls within the given range, but the minimum score for each letter grade might be lowered.

*Mid-term grades* will be posted in myUK by the deadline established in the [Academic Calendar](#).

### **Calculator:**

You may use calculators on the homework and exams. You may not use any machine that has symbolic manipulation capabilities of any sort on any exam. This precludes the use of TI-89, TI-Nspire CAS, HP 48, TI 92, Voyage 200, Casio Classpad or laptop computer. Also, you may not use your mobile phone, iPhone or Blackberry on any exam even if you forget your regular calculator. If it runs Android, GEOS, iOS, Linux, MacOS, PalmOS, Ubuntu, Unix, Windows, or similar operating systems, you cannot use it on the exams. Bald answers will receive little or no credit. A bald answer is one that is simply the output of a calculator routine or a single numerical or symbolic expression that has no supporting work.

### **Final Project:**

As part of the Gen Ed requirements, you are **required** to submit a final project by the end of the semester (see [Final Project](#) for details). Your project paper will be worth at most 20 points. These points will be added to the raw scores (attendance, homework, quizzes, midterms and final grades) that will determine your final letter grade.

### **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 and browser. You will need to create a REEF Student account and purchase a subscription. 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 are using REEF Polling in another class this term, you only need one subscription. You can access our REEF course by using the REEF Polling link on the Modules tab of our Canvas course page. See <https://reef-education.com/get-started/for-students/> for more information about REEF polling. If you have

any difficulties with access to your account or with bringing a phone or laptop to class, please see your instructor. See below for information about absences from lecture.

### **Policies:**

*Attendance and excused absences.* Attendance in MA137 is mandatory. Be on time and remain until dismissed. Do not leave in the middle of class. Whenever possible, please notify your instructor of absences prior to class.

S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit as reasonable cause for nonattendance by the professor. You may be asked to verify absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request *appropriate verification* when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

If you anticipate an absence for a major religious holiday please notify your instructor (in writing) of anticipated absences due to your observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859) 257-3737, [http://www.uky.edu/Ombud/ForStudents\\_ExcusedAbsences.php](http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php).

You are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

*Classroom behavior.* Electronic devices such as mobile phones, laptops and tablets should be put away or used only as part of class activities during lectures and recitations. Mobile phones, laptops, and computers may not be used during exams.

*Make-up policies.* Per Senate Rule 5.2.4.2, if you are missing any graded work due to an excused absence you are responsible for informing the Instructor about your excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The instructor will give you an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

In particular, if you have university excused absences or have university-scheduled class conflicts with uniform examinations you may arrange with their instructor to take the exam at an alternate time. Generally these make-up exams will be scheduled on the day of or on the day after the

regularly scheduled exam. Work-related conflicts are neither university excused absences nor university-scheduled absences.

*Students needing accommodations.* If you have a documented disability that requires academic accommodations, please see your instructor as soon as possible. In order to receive accommodations in this course, you must provide your instructor with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at [drc@uky.edu](mailto:drc@uky.edu). Their web address is <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/>.

*Accommodations for victims of violence:* By federal law, any student who is a victim of dating violence, domestic/intimate partner violence, sexual assault, or stalking (whether on or off campus) is entitled to appropriate accommodations for his or her coursework. To get help getting accommodations and other support, students who are assaulted can do any of the following:

1. Tell your instructor who can assist you in accessing resources appropriate to your situation;
2. Call the UK VIP Center (Violence Intervention and Prevention Center) at 257-3574 or [vipcenter@uky.edu](mailto:vipcenter@uky.edu) or [http://www.uky.edu/StudentAffairs/VIPCenter/about\\_contact.php](http://www.uky.edu/StudentAffairs/VIPCenter/about_contact.php); or walk in to the Center in Frazee Hall, lower level, between 8:30 and 5:00;
3. Call the University Counseling Center at 257-8701; 2nd floor, Frazee Hall;
4. Call Ms. Patty Bender from the UK Institutional Equity and Equal Opportunity at 257-8927 or [patty.bender@uky.edu](mailto:patty.bender@uky.edu);
5. **In the case of an emergency, contact the UK Police Department at 911.**
6. Students may also contact community resources 24-hours a day, including:
  - a. Bluegrass Rape Crisis Center at 800.656.4673 or <http://bluegrassrapecrisis.org/>
  - b. Greenhouse17 (formerly Bluegrass Domestic Violence Program) at 800.544.2022 or <http://greenhouse17.org/>

### **Academic Honesty:**

Cheating or plagiarism is a serious offense and will not be tolerated. It will be thoroughly investigated, and might lead to failure in the course or even to expulsion from the university.

See <http://www.uky.edu/StudentAffairs/Code/part2.html> (Sections 6.3.1 and 6.3.2) for information on cheating, plagiarism, and penalties.

A summary of recent changes to rules on cheating can be found at the Academic Ombud website:

<http://www.uky.edu/Ombud>