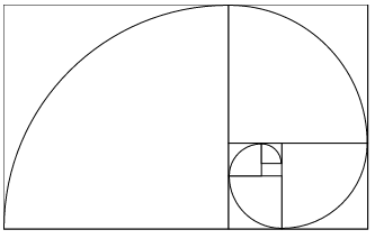

MATH 1062-003

Calculus II

MTWR, 1:00p-2:00p, WChar 277

Instructor:
Evan Young

Email Address: youngev@mail.uc.edu

Website: http://homepages.uc.edu/~youngev/teaching/math1062/

Office Location: 4307 French Hall

Office Hours: MW 2:30p-3:30p or by appointment

Note: this syllabus is subject to change. Changes will be announced in class and on Blackboard.

Course Description: The second part of a three-semester sequence of courses on calculus (MATH 1061/1060, 1062, 2063) for students in engineering and science. Topics covered include techniques of integration, applications of the integral, sequences and series, and vectors.

Prerequisite(s): A minimum grade of C is required in Math 1061.

Credit Hours: 4

Text: *Calculus: Early Transcendentals 8E, Brooks Cole*

Author: J. Stewart; **ISBN-13:** 978-1285741550

General Education

This course was designed following the guidelines of the University of Cincinnati General Education Program. It satisfies, or partially satisfies, the Quantitative Reasoning distribution requirement.

Homework:

Homework will be assigned via WebAssign, which you will access through Blackboard. Many of these problems require work by hand (in some cases, calculator usage is expected), but you will enter all solutions electronically on the website (you will receive immediate feedback through the WebAssign website). The deadlines for homework are, for the most part, Sunday and Wednesday nights at midnight, please see schedule below. It is your responsibility to make sure you remember the deadlines and manage your workload to meet them. Note that while one is not permitted for exams, you may use a calculator for the homework (in some cases, calculator usage is expected).

Worksheets:

We will work on worksheets every Monday, Tuesday, and Wednesday. These will be turned in at the end of class and will cover that day's topic. There will be no make-up worksheets.

Quizzes:

Quizzes will be administered every Thursday (excluding the Thursdays that Tests are administered on). Quizzes will cover the material from the past week. There will be no make-up quizzes for any reason. At the end of the semester your lowest quiz score will be dropped.

Email:

It is your responsibility to make sure you check the email address you registered in Blackboard. I will read all emails and am happy to reply to messages that are well written and thoughtful (in addition to other things, this means your e-mail should not read like a text message). That said, before e-mailing me, please check the syllabus carefully as it may contain the answer and will be much quicker than waiting for an e-mail response from me. I will be sure to answer emails at least once per day. Emails after 5pm may not be answered until the next day. Please make every attempt to ask mathematical questions (e.g. how to do homework problems) in office hours instead of email, as it is very difficult to communicate mathematics using only text.

Exams and Important Dates:

- Last day to add: Monday, May 16, 2016
- Last day to drop: Tuesday, May 24, 2016
- Memorial Day: Monday, May 30, 2016 NO CLASS
- Midterm I: Thursday, June 2, 2016, in class
- Midterm II: Thursday, June 30, 2016, in class
- Independence Day: Monday, July 4, 2016 NO CLASS
- Last day to withdraw: Friday, July 15, 2016
- Midterm III: Thursday, July 28, 2016, in class
- Final Exam: Thursday, August 4, 2016, in class

Testing Policies:

- Participation in the three tests and the final is mandatory.
- No technology/calculators will be required or permitted in the quizzes, tests, and final.
- Cell-phones and other communication devices are prohibited.
- Students need to bring their University of Cincinnati ID.

- Exceptions to the mandatory attendance to the tests and final will be granted, provided that the appropriate evidence/documentation is brought to the instructor as soon as possible, for the following reasons:

  (1) Documented health or serious family problems.

  (2) Documented University business (like sport engagements).

  (3) Documented conflict with other UC classes.

  (4) Serious and unavoidable work conflict, documented by a written statement from the employer. The statement must assert explicitly unwillingness to give leave to the student for that specific test and must be dated at least 10 days before the Test 1 and one month before successive tests. A copy of the regular working schedule is not enough. You can present to the employer a copy of this syllabus or you can ask me to write a statement for you to the employer.

  (5) In exceptional cases other reasons may be considered.

- Students registered with Disability Services, as needing special testing facilities or extended time, can take the test in the testing center at the same time as the other students, or beforehand. Students will not be able to leave the testing center prior to ten minutes after the official start time of the test, if the test is taken prior to the official start time of the test (Students may not leave the testing center before 5:10, for example, if the official start time is 5:00.). Arrangements must be made in advance and I should be notified by email at least 3 days before the test.

- Conflicts (with other classes and activities) can be accommodated with some flexibility in the testing time. In this case, I should be notified, by email, at least 3 days before the test.

- Final exam: The final exam will be on Thursday, August 4, 2016, in class (this is the last day of class).

- If you believe that a grading error has occurred in a test, you must request the test to be re-graded within the next week after it was returned.

Grade Distribution:

Quizzes	15%
Homework	10%
Worksheets	5%
Midterms I, II, and III	15% each
Final Exam	25%

Letter Grade Distribution:

93 - 100	A	87 - 89	B+	77 - 79	C+	67 - 69	D+	0 - 59	F
90 - 92	A-	83 - 86	B	73 - 76	C	63 - 66	D		
		80 - 82	B-	70 - 72	C-	60 - 62	D-		

Academic Integrity:

The University Rules, including the Student Code of Conduct, and other documented policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism or cheating, will be dealt with on an individual basis according to the severity of the misconduct.

Tutoring:

- Students are strongly recommended to come to the office hours of the instructor for any questions related to the class.
- Peer Tutoring is offered for this course by the Learning Assistance Center (LAC). Tutoring sessions are designed to allow students to work one-on-one with a qualified and trained peer tutor to address course content and study skills. Students may schedule appointments online at https://lacscheduling.uc.edu. For more information about the tutoring program as well as days, times, and scheduling instructions, please refer to the LAC website: www.uc.edu/tutoring
- Study table for this course is scheduled by the Math and Science Support (MASS) Center at 2441 French Hall. During the listed times, students will be able to work collaboratively with each other under the guidance of a highly-trained tutor. No appointment is necessary for these tutoring sessions, but there are a limited number of seats available on a first-come, first-served in the MASS center. You can find the schedule and more information about the MASS Center at http://www.uc.edu/masscenter.html

Special Needs Policy:

If you have any special needs related to your participation in this course, including identified visual impairment, hearing impairment, physical impairment, communication disorder, and/or specific learning disability that may influence your performance in this course, you should meet with the instructor to arrange for reasonable provisions to ensure an equitable opportunity to meet all the requirements of this course. At the discretion of the instructor, some accommodations may require prior approval by Disability Services.

Attendance:

You are expected to attend every day. You are responsible for any announcements made in class. I will track attendance through the worksheets that are turned in. Repeated absences will negatively affect your grade.

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class. However, you must keep up with the reading assignments.

Week #	Date	Material	Quiz/Test	Homework W/Su
Week 1	May 9	7.1 - 7.2	Quiz 1	None / 7.1 & 7.2
Week 2	16	7.3 - 7.5	Quiz 2	7.3 / 7.4 & 7.5
Week 3	23	7.8 & 8.1	Quiz 3	7.8 / 8.1
Week 4	30	8.2	Midterm I - 6/02 (Ch 7, 8.1 & 8.2)	8.2 / None
Week 5	June 6	11.1-11.2	Quiz 4	11.1 / 11.2 & 11.3
Week 6	13	11.4-11.6	Quiz 5	11.4 / 11.5 & 11.6
Week 7	20	11.7-11.9	Quiz 6	11.7 / 11.8 & 11.9
Week 8	27	11.10-11.11	Midterm II - 6/30 (Ch 11)	11.10 & 11.11 / None
Week 9	July 4	10.1-10.2	Quiz 7	10.1 / 10.2
Week 10	11	10.3-10.4	Quiz 8	10.3 / 10.4
Week 11	18	12.1-12.2	Quiz 9	12.1 / 12.2
Week 12	25	12.3-12.4	Midterm III - 7/28 (Ch 10.1-10.4 & 12.1-12.5)	12.3 & 12.4 / None
Week 13	August 1	12.5 & Review	Final - 8/4	

Learning Objectives

Techniques of Integration

- Recall the integration by parts formula and use it to calculate both indefinite and definite integrals. Evaluate definite and indefinite integrals using a combination of a substitution rule and integration by parts.
- Compute integrals of basic trigonometric functions (such as products or simple quotients of integer powers of sine and cosine or tangent and secant). In particular, recognize when to use a substitution (and how to choose a proper substitution in that case) and when to use a double (half) angle formula for sine/cosine functions. Recall the necessary double (half) angle formulas.
- Recognize for what types of integrals a trigonometric substitution is suitable. Select a proper trigonometric substitution. Compute both, definite and indefinite integrals, using the method of trigonometric substitution. Recall the completion of square process and use it in combination with trigonometric substitution.
- Perform long division for polynomials to turn any rational function into a sum of a polynomial and a proper rational function. Represent a proper rational function as a linear combination of partial fractions. Use the method of partial fractions (possibly in combination with methods learned previously) to compute definite and indefinite integrals.
- Combine all the methods of integration previously learned with basic simplification and substitution rule to compute various integrals.
- Recall the definitions of an Improper Integral of Type 1 and Type 2. Use these definitions to compute an improper integral if it is convergent, or to show that it is divergent.
- Recall the statement of the Comparison Test for Improper Integrals and apply it.

Integration

- Use definite integrals to calculate lengths of curves
- Examine arc length functions and find arc length of a curve from a starting point to any other point on that curve
- Estimate surface areas of revolution using Riemann Sums
- Use definite integrals to calculate surface areas of solids of revolution

Parametric Equations

- Sketch curves defined by parametric equations
- Find Cartesian equations of curves defined by parametric equations
- Apply Chain Rule to find the equation of the tangent line to points on curves described by parametric equations
- Apply Substitution Rule to calculate areas under curves described by parametric equations

- Recall arc length of curves described by parametric equations and calculate lengths of curves
- Calculate surface areas of revolution described by parametric equations

Sequences

- Recall the definition of limit of a sequence
- Determine if a sequence is convergent or divergent
  - Apply limit laws and continuity properties
  - Analyze sequences to select appropriate laws
  - Recall and apply the squeeze theorem
- Recall the definition of bounded sequence and monotonic sequence
  - Recall the theorem every bounded, monotonic sequence is convergent and apply to deduce convergence of a sequence

Series

- Recall the definition of convergent series and divergent series, in terms of the sequence of partial sums
- Identify the following types of series and determine if convergent or divergent: geometric, p-series, telescoping, alternating
  - Determine the sum of a convergent geometric series
- Determine the convergence or divergence of a series
  - Recall the series tests
  - Analyze series to select appropriate tests
- Determine the sum of a convergent series using series laws (when possible)
- Estimate the sum of a convergent series
  - Analyze series to select appropriate estimation method
- Recall the definition of absolutely convergent
- Recall the difference between absolutely convergent and conditionally convergent
- Recall and apply the Ratio Test and Root Test for absolute convergence

Power Series

- Write the general form of a power series and give an example
- Identify whether a given series is a power series or not
- Distinguish power series from other types such as no-variable series, trigonometric/Fourier series or Laurent series
- Identify the center of a given power series

- Define the radius of convergence that comes from a theorem about interval of convergence of a power series. State the theorem
- Compute the radius of convergence of a given power series using either the Root Test or the Ratio Test
- Compute the interval of convergence by solving for the radius of convergence and testing the endpoints of the open interval of convergence for convergence
- Given a hypothetical series $\sum_{n=0}^{\infty} c_n(x-a)^n$ where a is give but not c_n, possibly x is given, tell whether $\sum_{n=0}^{\infty} c_n k^n$ converges or diverges and explain
- Given a hypothetical series $\sum_{n=0}^{\infty} c_n(x-a)^n$, a number y where the series is convergent, and another number z where the series is divergent, tell whether other values for x makes the series convergent or divergent and explain
- Differentiate and anti differentiate power series functions. Determine its radius of convergence.
- Utilize the theorem $|x| < 1 \Rightarrow \sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ to turn some rational functions and functions involving natural logarithm and arctangent into a power series without using Taylor or Maclaurin series expansion. This includes antidifferentiating rational functions and differentiating known power series expansions of functions
- Approximate a definite integral using power series and within a given interval of error
- Compute the Maclaurin series of a given function
- Compute the Taylor series of a given function about a given center
- Compute the n-th Taylor polynomial of a given function
- Use the binomial series to expand a given functions as a power series
- Use the Maclaurin series expansion of an analytic function to approximate its value at a given number
- Compute the indefinite integral of a given analytic function as a series
- Use series to approximate the definite integral within a given accuracy
- Use series to evaluate limits
- Evaluate the sum of a given infinite series by recognizing it as a series expansion of a known function evaluated at a point
- Compute the n-th derivative of a given function at a number by using a coefficient of its Taylor series expansion
- Express a given power series into a rational or other elementary transcendental function using the geometric series convergence formula and its derivatives
- Define Taylor series of a function centered at a
- Define the n-th degree Taylor polynomial of a function about a center

- Compute the binomial series expansion of a given function involving a binomial roots/radicals
- Write the first k terms of the power series of a product or quotient of two given power series
- Use Alternating Series Estimation Theorem to estimate the size of an error of a Taylor polynomial approximation

Vectors

- Recall that a three- dimensional coordinate system is a one to one correspondence between points in the space an ordered triples in $\mathbb{R}^3$
  - Describe and sketch the position of points in a rectangular three-dimensional coordinate system
  - Describe and use the distance between points formula
  - Determine the equation of a sphere given the center and the radius
  - Describe regions in space determined by equations and/or inequalities
- Recall the definition of a vector
- Determine when two vectors, u and v, are equivalent
- Represent and interpret the addition of vectors geometrically
- Represent and interpret the multiplication of a vector by a scalar geometrically
- Represent vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$
- Recall the definition of dot product of two vectors
- Recall the definition of angle between two nonzero vectors
  - Recall the theorem "If θ is the angle between the nonzero vectors a and b then $a \cdot b = |a||b| \cos\theta$"
  - Use the theorem to determine the angle between two nonzero vectors
  - Recognize when two nonzero vectors are orthogonal
  - Find the direction angles and the direction cosines for a nonzero vector
  - Represent a vector in $\mathbb{R}^2$ and $\mathbb{R}^3$ using its magnitude and direction cosines and interpret geometrically
- Calculate and interpret geometrically the scalar projection of a vector b onto a vector a
- Calculate and interpret geometrically the vector projection of a vector b onto a vector a
  - Use projections to calculate the amount of work done by a constant force when moving an object from a point A to a point B
- Reproduce the definition of the cross product of two vectors
  - Calculate cross products of vectors using determinants
  - Recall the theorem "If θ is the angle between vectors a and b then $|a \times b| = |a||b| \sin\theta$"

  - Interpret the magnitude of the cross product of a and b as the area of the parallelogram determined by the vectors a and b

- State and prove the properties of vector products
  - Use triple products to calculate the volume of a parallelepiped with sides determined by vectors a, b, and c
- Write the vector equation of a line through a point in $\mathbb{R}^3$ in the direction of a given vector
- Write the parametric equations of a line through a point in $\mathbb{R}^3$ in the direction of a given vector
- Write the symmetric equations of a line through a point in $\mathbb{R}^3$ in a given direction vector
- Determine the vector equation of a line segment
- Recall the definition of normal vector to a plane
- Write the vector equation of a plane
- Determine the scalar equation of a plane
  - Calculate the distance from a point in $\mathbb{R}^3$ to a plane
  - Calculate the distance between parallel planes