

Calculus 3 MTWF 1:00-1:50PM Fall 2021 SH 405

Instructor:	Jonathan White, jwhite@coe.edu
Chair:	Gavin Cross, gcross@coe.edu
Web Page:	public.coe.edu/~jwhite
Office:	Stuart 311
Office Hours:	(Zoom link on web page) 9:30-9:50am TTTh, 11:00-11:30am MWF, and by appointment
Office Phone:	319-399-8280
Text:	<i>Essential Calculus, Early Transcendentals</i> , Second Edition, by James Stewart
WeBWorK and Quizzes:	There will be several problem sets and quizzes during the semester, as well as online WeBWorK assignments. Together these will be worth 250 points.
Math Culture Points:	Math Culture Points will constitute 50 points. These will be earned through participation in various activities outside of class, as detailed on the third page of this syllabus.
Exams:	There will be three in-class exams administered during class time. The dates of these are indicated in the schedule on the back side of this sheet. These exams will be worth 100 points each. The final exam will be held during finals week at the date and time indicated on the back side of this sheet. The final will be worth 200 points.
Grading:	Grading will approximately follow a [92.0%, 4) \mapsto A, [90%, 92%) \mapsto A-, [87%, 90%) \mapsto B+, [82%, 87%) \mapsto B, [80%, 82%) \mapsto B-, [77%, 80%) \mapsto C+, [72%, 77%) \mapsto C, [70%, 72%) \mapsto C-, [67%, 70%) \mapsto D+, [62%, 67%) \mapsto D, [60%, 62%) \mapsto D-, $(-\infty, 60%) \mapsto$ F scale. Current grade information will be available online through Moodle at all times.
Makeups:	For the sake of fairness to those who follow the schedule, makeups for exams will be allowed only under extenuating circumstances, with documentation and advance notice when humanly possible. Late problem sets and quizzes will generally not be accepted, and if accepted due to extenuating circumstances will generally be subject to a penalty of 20% of the possible points for each day past due. Late WeBWorK will generally not be accepted.

Any student entering this class should already be aware that calculus is the mathematics of changing quantities. The major development in Calculus 3 is that we widen our scope to functions of more than one variable. This simultaneously adds tremendously to the breadth of phenomena that can be addressed, and also introduces complications that have no analog in the essentially two-dimensional world of Calculus 1 and 2.

Calculus 3 is the culmination of the calculus sequence, and this presents challenges in at least three respects. First, ability to visualize and use spatial intuition is taken to a new level. Second, computations are in some cases correspondingly bigger and longer. Third, abstract theoretical considerations become a more central element, increasingly overshadowing mere computations as the most important material. In response to all three of these considerations the judicious use of technology can be a valuable aid. Sophisticated calculators such as the TI-89 and computer software packages such as Mathematica or CoCalc, when used well, can lead to easier and deeper understanding of the course material. However the use of this technology itself involves a significant learning experience, and often significant frustrations. We will attempt to use CoCalc in this course when the benefits are the greatest, and assist you in its use enough to keep the frustrations to a minimum.

To enter this class, each student must pass a computer-administered antiderivatives “gateway” exam. You may attempt this exam as often as desired, provided that you demonstrate understanding of previous mistakes before a retake. Success by 10pm Wednesday, 8/25 will count as 30 points toward a student’s WeBWorK score; success within a week of that earns 20 out of 30 points, and so on, meaning negative scores if the gateway is not completed by 5pm on 9/15.

If at some point the challenges or frustrations of this class get too bad, I strongly encourage you to see me for extra explanation – don’t wait until you’re overwhelmed. I’m here to help.

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		8/18 §10.1 \mathbb{R}^3	8/20 §10.2 Vectors
8/23 §10.3 Dot Products	8/24 §10.4 Cross Products	8/25 §10.5 Lines	8/27 §10.5 Planes
8/30 §12.6 Quadric Surfaces	8/31 §12.6 Quadric Surfaces	9/1 §11.1 $f: \mathbb{R}^n \rightarrow \mathbb{R}$	9/3 §11.2 Limits & Continuity
9/6 No Class -- Labor Day	9/7 §11.3 Partial Derivatives	9/8 §11.4 Tangent Planes	9/10 §11.5 Chain Rule
9/13 §11.6 Directional Derivatives	9/14 §11.6 Directional Derivatives	9/15 §11.7 Optimization	9/17 §11.7 Optimization
9/20 §11.8 Constrained Opt	9/21 §11.8 Constrained Opt	9/22 Review for Exam	9/24 Exam 1
9/27 §12.1 Double Integrals	9/28 §12.1 Double Integrals	9/29 §12.2 General Double Integrals	10/1 §12.2 General Double Integrals
10/4 §12.3 Double Int. in Polar	10/5 §12.4 Applications	10/6 §12.5 Triple Integrals	10/8 No Class -- Fall Break
10/11 §12.5 Triple Integrals	10/12 Cylindrical	10/13 §12.6 Int. in Cylindrical	10/15 Spherical
10/18 §12.7 Int. in Spherical	10/19 §12.8 The Jacobian	10/20 Review for Exam	10/22 Exam 2
10/25 §10.7 Vector Functions	10/26 §10.7 $\mathbf{r}'(t)$	10/27 §10.8 Arc Length & Curvature	10/29 §13.1 Vector Fields
11/1 §13.2 Line Integrals	11/2 §13.2 Line Integrals	11/3 §13.3 Fun. Theorem of Line Int	11/5 §13.4 Green's Theorem
11/8 §13.5 Curl & Divergence	11/9 §13.6 Parametric Surfaces	11/10 §13.7 Surface Integrals	11/12 §13.8 Stokes' Theorem
11/15 §13.9 Divergence Theorem	11/16 §13.10 Summary	11/17 Review for Exam	11/19 Exam 3
No Class -- Thanksgiving Break			
11/29 Quadratic Approximation	11/30 Complex Arithmetic	12/1 Euler's Formula	12/3 Review for Final
Final Exam -- 11am on Wednesday 12/8			

Any students with disabilities which might affect their performance in this class should contact me as soon as possible to arrange accommodations.

Coe's faculty has adopted an academic integrity policy. It is your responsibility to understand and follow it.

Diversity, in all its forms, is valuable.

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Math Culture Points

A portion of the grade for this course will take the form of Math Culture Points. These will be earned through activities outside of class including, but not necessarily limited to, those listed below:

Activity	Points	Max #
Colloquium Attendance	5	--
Colloquium Presentation	5-15	2
Conference Attendance Midwest Sports Analytics Meeting?	5-15 15	2
Mathematics Competition Participation Putnam Exam	15	2
Math Culture Reading Specific readings will be posted, typically around 6 each semester Any article from Math Horizons With approval, any relevant article from Math Magazine, CMJ, etc.	5	-- 3 3
Math Club Activities (when appropriate) Movies, Math Club portion of the Playground of Science, Speakers, Workshops, etc.	5	--
Other Appropriate Coe or Outreach Activities Chess Club Meeting Job Shadowing in any relevant field Other Volunteer Outreach (Garfield, McKinley, etc. – talk to Jon for information!)	5 10 5	3 1 4

You should plan to spread your participation throughout the semester. In each case above, credit assumes both full participation and posting a brief summary/response on Moodle **in a timely manner**. These reflections should generally be between 100 and 300 words, and include both a brief summary and your personal thoughts on the event, and **must be submitted within one week of the event**, or within the specified time window for other activities. Up to three units of credit may be submitted after normal deadlines in the “Math Culture – Late” category on Moodle, but otherwise exceptions will not be made without serious extenuating circumstances.

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Learning Outcomes

By the end of this class each student should be able to demonstrate:

- understanding of limits and continuity of multivariable functions.
- understanding of derivatives of multivariable functions.
- understanding of multiple integrals.
- understanding of vector calculus, including generalizations of the Fundamental Theorem of Calculus.
- understanding of selected applications of the above concepts.

The Provost has mandated that the material below this line appear on all syllabi:

Mission Statement:

Coe College is a national, residential liberal arts college offering a broad array of programs in the arts, sciences, and professions. Our mission is to prepare students for meaningful lives and fulfilling careers in a diverse, interconnected world. Coe's success will be judged by the success of our graduates.

Academic Integrity

At Coe College, we expect academic integrity of all members of our community. Academic integrity assumes honesty about the nature of one's work in all situations. Such honesty is at the heart of the educational enterprise and is a precondition for intellectual growth. Academic dishonesty is the willful attempt to misrepresent one's work, cheat, plagiarize, or impede other students' academic progress. Academic dishonesty interferes with the mission of the College and will be treated with the utmost seriousness as a violation of community standards. Please refer to the Coe College Academic Catalog for complete information regarding Academic Integrity:

www.coe.edu/academics/academic-resources/provosts-office/academic-integrity-policy

FERPA

Students should be aware of their rights regarding the privacy of their educational records. Detailed information about your rights can be found under the FERPA (Family Educational Rights and Privacy Act of 1974) section in the Academic Catalog and online here: <https://www.coe.edu/academics/academic-resources/registrar/ferpa>

In line with FERPA restrictions, students should be aware that an instructor cannot

publicly post grades by student name, institutional student identification number, or social security number without first having obtained students' written permission.

The Definition of a Course Credit & Expected Workload

One course credit at Coe College constitutes 180 hours' worth of student work over the course of the term. "The Department of Education has defined one hour to be 50 minutes, so 150 60-minute hours is equivalent to 180 50-minute hours." This figure includes both the time spent in class and out of class completing course work. In other words, students are expected to devote a considerable amount of time outside of class to this course. For courses that meet in a standard MWF or T-Th slot, students should be expected to work seven hours a week outside of the three hours in class.

Requesting Academic Accommodations

Coe College is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning in this course, please visit my office hours to discuss these concerns with me. If you have a medical, physical, psychological, or learning need documented by a healthcare provider, or experience an unforeseen obstacle during the semester, you can make an appointment with Laura Hayes, Accessibility Services Coordinator, to request an official accommodation under the Americans with Disabilities Act. You can find more information about the Accessibility Services Office by visiting the Learning Commons website or by emailing accessibility@coe.edu. If you have already been approved for accommodations through Accessibility Services, please meet with me so we can develop a plan for your success together.

Reporting of Sexual Assault or Misconduct

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as a faculty member. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in any one-on-one meetings. I will keep the information you share with me private to the greatest extent possible. However, I am required to share information regarding sexual misconduct or students who may be in danger to themselves or to others. Students may speak to someone confidentially by contacting Student Life at 319-399-8843 or emailing titleix@coe.edu, Safety, and Security at 319-399-8888, Emily Barnard (college counselor) at 319-399-8843, or visit Coe's Title IX website for more information.