MATH 110 Techniques of Calculus I - Summer 2020

Course Description

General

Math 110 is an entry-level course in mathematics that introduces the skills associated with the application of calculus techniques to numerous applications including economics and business. We will review and deepen our understanding of functions you have been introduced to in Math 21 and Math 22 including polynomial and exponential functions as well as introduce some basic trigonometric functions (sine and cosine). We will cover the concepts of derivatives and integration and see them applied in a variety of contexts. Most topics will be explored analytically and graphically as they are applied to real-life examples and problems. Students are expected to study the concepts and examples and be able to extend the skills and techniques to the solution of similar problems.

University Catalogue Description

Techniques of Calculus I (4 credits) Functions, graphs, derivatives, integrals, techniques of differentiation and integration, exponentials, improper integrals, applications. Students may take only one course for credit from MATH 110, 140, 140A, and 140B.

Prerequisites

MATH 022 or satisfactory performance on the mathematics proficiency examination.

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Required Text and Equipment

Textbook

Applied Calculus, 6th Edition by D. Hughes-Hallet (Wiley, 2018).

ISBN: 978-1-119-39935-3

An e-text or loose leaf copy will suffice and you may purchase **or rent** it directly from the publisher (Link to Wiley's official book page) or a number of online vendors.
You do NOT NEED the WILEY Plus subscription as we will not use it.

Computer

You will need a device that is able to run Canvas and on which you can watch instructional videos and attend Zoom live sessions. Most reasonably modern devices (desktops, laptops and tablets) will suffice. We recommend using Google Chrome or Mozilla Firefox. Safari has had some trouble with Canvas in the past.

However, to take proctored exams, you will need a desktop or laptop with

- Built-in or external webcam
- Built-in or external microphone
- Built-in or external speakers

Tablets and Chromebooks are **not** supported for exams. Your internet connection will need to have upload and download speeds of at least 2Mbps.

No calculators are permitted on the proctored exams.

We have put together a technical checklist where you can test your equipment for the essential functions needed for this course.

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Course Objectives

Math 110, Techniques of Calculus I focuses on learning and practicing the fundamental rules of calculus and their applications to business and the sciences. I will take many opportunities to remind you of the underlying concepts during lecture, and you should attain a broad conceptual understanding of the theory by semester's end. Assessments and exams are problem centered but also include questions that test your conceptual understanding.

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

1. Identify polynomial, rational, power, periodic, exponential, and logarithmic functions.
2. Calculate the domains of polynomial, rational, power, exponential, and logarithmic functions.
3. Calculate the sums, differences, products, quotients, and compositions of functions.
4. Model cost, revenue, profit, supply, and demand business functions.
5. Calculate equilibrium points within supply/demand markets and interpret the results.

6. Calculate or estimate finite/infinite limits of functions given by formulas, graphs, or tables.
7. Calculate one-sided limits of functions.
8. Determine whether a function given by a graph or formula is continuous at a given point or on a given interval.
9. Determine whether a function given by a graph or formula is differentiable at a given point or on a given interval.
10. Distinguish between average and instantaneous rate of change and interpret the definition of the derivative graphically.
11. Determine derivatives of some functions using the definition of derivative of a function.
12. Calculate derivatives of polynomial, rational, power, periodic, exponential, and logarithmic functions, and combinations of these functions.
13. Apply the ideas and techniques of derivatives to cost/average cost, revenue/average revenue, profit/average profit, supply, and demand models.
14. Apply the ideas and techniques of derivatives to perform marginal analysis of basic economics models.
15. Apply the ideas and techniques of derivatives to calculate elasticity of basic economics models.
16. Apply the ideas and techniques of derivatives to finding extrema.
17. Apply the ideas and techniques of derivatives to graphing functions.
18. Apply the ideas and techniques of derivatives to optimization problems to include basic algebraic/geometric models and cost, revenue, profit, supply, and demand models.
19. Apply the ideas and techniques of derivatives to solve compound interest, continuous interest, effective interest rate, and present value business models.
20. Calculate the Riemann sum for a given function, partition and collection of evaluation points.
21. Describe a definite integral as the limit of a Riemann sum. Determine anti-derivatives of basic algebraic functions.
22. Calculate values of definite integrals using anti-derivatives and areas. Apply substitution techniques to integrate basic functions.
23. Apply the ideas of definite integrals to solve problems of areas.
24. Calculate the average value of business models using the definite integral.
25. Apply the ideas and techniques of the definite integral to evaluate consumer/producer surplus,future/present value of income streams, and annuity business models.

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Student Responsibilities

As a student enrolled in this course your responsibilities include the following:

- Abide by Penn State's policies on Academic Integrity.
- Complete assignments on time and keep pace with the course.
- Make sure to receive and read all course communications sent by the instructors.

- Devote sufficient time and diligent effort to completing course work.
  (About 10 hours a week, more if you need to review algebra concepts as you go).
- View the recorded lectures each week.
- Participate in the Discussion forum for this class.
- Be an engaged participant by seeking help and asking questions for clarifying concepts you do not fully understand.
- Using the quiz feedback to understand where you have the greatest difficulties and follow up on resolving these.

Intent To Graduate:

If you are planning to graduate this semester, please communicate your intent to graduate to your instructor. This will alert your instructor to the need to submit your final grade in time to meet the published graduation deadlines. For more information about graduation policies and deadlines, please see the Graduation page on the World Campus Student Resources Web site.

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Course Structure

All exams, tests, and quizzes will be taken in CANVAS. We may merge several sections of this class into a single Canvas section. This way we will be able to offer more live sessions and better student support in the discussion forum or via email.

The course is divided into Lessons (Canvas Modules). Each Lesson in Canvas encompasses approximately one week of work.

Lesson Overview (each lesson)

- Suggested Readings from Textbook
- A set of Pre-Recorded Lectures
- Assigned problems from Textbook (not collected or graded)
- One Quiz (~15 questions, timed, 3 attempts)
- Two (or more) Live Session(s), recorded for later viewing

Course Components

- A *Getting Started Lesson* (12-point review quiz and 8-point syllabus quiz)
- 12 Regular lessons (12 lesson quizzes, 25 points each, 300 total points)
- 6 Chapter Tests (unproctored, 30 points each, 180 total points)
- 1 Proctored Midterm Exam (proctored, 200 points)
- 1 Proctored Comprehensive Final Exam (proctored, 300 points)

Lesson Detail

Suggested Reading and Problems from the text
Each lesson has a reading and homework assignment. Homework assignments are not turned in for grading, but these assignments are critical to succeeding in the course. The assigned problems are your first opportunity to apply the concepts from lectures and test yourself on how well you understand the material. For most of the assigned problems, answers are available in the back of the book. **Ideally**, you will work on the assigned problems and **post questions** in a Discussions thread when you encounter challenges. Asking questions and getting specific feedback to clear up your misunderstandings is one of the best ways to learn and we are prepared to respond quickly and thoroughly to your questions.

Prerecorded Lectures
Each lesson includes a set of prerecorded lectures covering topics for the week. These lectures are typically 10-15 minutes in length (60-90 mins total). Each lecture covers one or two particular topics or concepts, along with examples. This allows you to focus on one topic at a time, at your own pace, though the pace must be fast enough to keep up with the course. We may also post video responses to student questions.

Live Lectures
There will be two live lectures each week, together covering the material of the week's lesson. Each lecture will be held in Zoom and will also be recorded for those who cannot make it to the live lecture.

Live Study Session
There is a live study session each week with a tutor from Penn State Learning, working additional examples and offering an opportunity for live questions and feedback. These sessions are recorded for those who are not able to attend the live lecture. However, the content of the session will depend in part on your questions and/or the points of difficulty in the lesson. If you are not able to attend the live lecture, you may still submit questions via the discussion forum.

Lesson Quiz (25 points, timed, 75 minutes)
Each lesson has a quiz worth 25 points. You can take each Lesson quiz up to 3 times. However the **first attempt must be taken by midnight three days prior to the quiz due date in each lesson cycle**; otherwise you have only two attempts for that lesson. You will have immediate detailed feedback on the solutions after each quiz attempt. This feedback along with the multiple quiz attempts is designed to make the quizzes a valuable learning tool, not simply an assessment. It is counterproductive to attempt all three quiz attempts in quick succession. Use the feedback on each attempt to learn where you need additional review. Each quiz attempt is pulls questions randomly from a question bank, so each attempt will have new questions (though some questions may repeat).

Your quiz grade will be based on the **highest score of the 3 attempts**. The total for the Lesson quizzes: **300 points**.

Chapter Tests and Proctored Exams

Chapter Tests (30 points each - timed, 75 minutes)
There is one unproctored chapter test for every two lessons. Each chapter test is due one week after the last lesson quiz from the associated chapter. For example, Lesson 1 and Lesson 2 cover chapter 1. The Chapter 1 test is due one week later than the Lesson 2 quiz. See the schedule for the exact Chapter Test due dates. Chapter tests are similar to the Lesson Quizzes; you are given two attempts on each Chapter Test. Unlike the quizzes, detailed solutions will not be provided after each attempt, but on your second Chapter Test attempt, you'll have a very similar and/or the same set of questions, and you'll know which problems you got wrong on your first attempt. The 6 (six) chapter tests account for **180 points** towards your final grade.

The chapter tests are *low-stakes exams* that help you review material as we progress through the course, help you identify areas in which you need additional work, and prepare you for the proctored exams. Your textbook has chapter review problems at the end of each chapter. These are a great resource for practice problems and additional study.

Midterm exam (200 points)
There is one proctored midterm exam (20 problems, 90 minutes). You will have the opportunity to take a **practice midterm exam for extra credit**. The practice exam has more value if it is taken several days before your scheduled exam, giving you more opportunity for review; thus, the practice exam will CLOSE prior to when the midterm exam becomes available. **No calculators are permitted on the Midterm Exam**. [Updated 06/19: notes are permitted]

Final Exam (300 points)
There is a **proctored** comprehensive final exam. (25 problems, 120 minutes). You will have the opportunity to take a **practice exam for extra credit**. The practice exam has more value if it is taken several days before your scheduled exam, giving you more opportunity for review; thus, the practice exam will CLOSE prior to when the final exam becomes available. **No calculators are permitted on the Final Exam**. [Updated 06/19: notes are permitted]

Proctoring - use of a proctoring service
This course may require you to take exams using certain proctoring software that uses your computer's webcam or other technology to monitor and/or record your activity during exams. The proctoring software may be listening to you, monitoring your computer screen, and viewing you and your surroundings. By enrolling in this course, you consent to the use of the proctoring software selected by your instructor, including but not limited to any audio and/or visual monitoring which may be recorded.

Grade Scale - 1000 total points available

Final course grades will be assigned as follows:

Grade	Points	Percent Score
A	926 - 1000	93% - 100%

Grade	Points	Percent Score
A-	896 - 925	90% - 92%
B+	866 - 895	87% - 89%
B	826 - 865	83% - 86%
B-	796 - 825	80% - 82%
C+	766 - 795	77% - 79%
C	696 - 765	70% - 76%
D	596 - 695	60% - 69%
F	0 - 595	0% - 59%

Deferred Grades

Students who are unable to complete the course because of illness or emergency may be granted a deferred grade which will allow the student to complete the course within the first six weeks of the following semester. Note that deferred grades are limited to those students who can verify and document a valid reason for not being able to take the final examination. For more information see DF grade

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Getting Help!

There are many places to get help and assistance with this course. We encourage ALL students to obtain help as needed.

Piazza Discussion Forum

All mathematical questions and general questions regarding class proceedings should be posted in the Piazza Discussion Board

Questions about homework problems or more general questions are usually helpful to all students and should be public posts. You are also encouraged to answer other students' questions! Posts to Piazza will generally result in the fastest feedback.

Please use descriptive subjects in your post to help everyone understand what the post concerns. For questions about homework use the Section number and problem number as the subject: Section 5.1 #33.

Instructor Email

Use the Canvas email tool to contact instructors. For general questions that will be helpful to all students, submit your questions to the Piazza Discussion Forum.

Live Sessions

Each week there are live sessions with the instructors. This is another opportunity to ask questions and get specific help while going over problems in the current lesson. All sessions are recorded for later viewing.

Online Office Hours

Every Saturday at 10am, there will be online office hours with a free Q&A format. You can also request online meetings with individual instructor by appointment.

World Campus Support

For technical problems with Canvas, please contact the World Campus helpdesk: https://student.worldcampus.psu.edu/technical-support/contact-us.

Additional Resources

In addition to the resources we provide, there are many freely available resources available to you on the web. One of the best is The Khan Academy (Links to an external site.). (Links to an external site.)You can find recorded lectures on prerequisite topics as well as all calculus topics covered in this course, along with additional practice problems.

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Examity:
In this class you will take your tests remotely and they will be proctored by a service called Examity®. Please log in as soon as possible to set up your profile. You will not be able to schedule exams until your profile is complete. Examity® system requirements are:

- Desktop computer or laptop (tablets, Chromebook and cell phones do not meet our requirements)
- Webcam and microphone (built-in or external).
- Connection to network with sufficient internet speed: at least 2 Mbps download speed and 2 Mbps upload.
- Operating systems: Windows XP–Windows 10, Mac OS X 10.8 (Mountain Lion)–10.11 (El Capitan)
- Browser with pop-up blocker disabled: Google Chrome v39 or later, Mozilla Firefox v34 or later, Internet Explorer v8 or later, Microsoft Edge, Apple Safari v6 or later.

After you create your Examity profile, you will have the option to schedule proctoring times for each of your exams. On the day of your exam, go to your Examity dashboard using the single sign-on link and select the 'Start Exam' button to meet your proctor.

Examity Proctors:
Examity's proctors are highly-trained individuals who go through a rigorous process of selection, including background checks and comprehensive training. All proctors have a college degree, advanced technical and communication skills, and have completed online courses.

Proctoring Terms of Service:
This course may require you to take exams using certain proctoring software that uses your computer's webcam or other technology to monitor and/or record your activity during exams. The proctoring software may be listening to you, monitoring your computer screen, viewing you and your surroundings, recording and storing any and all activity (including visual and audio recordings) during the proctoring process. By enrolling in this course, you consent to the use of the proctoring software selected by your instructor, including but not limited to any audio and/or visual monitoring which may be recorded. Please contact your instructor with any questions.

This information is provided by Penn State World Campus.
https://student.worldcampus.psu.edu/examity-proctored-exams

If you have any technical questions or concerns, contact Examity's support team 24/7 via email at **support@examity.com** or phone at (855) 392-6489.

Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Academic dishonesty includes, but is no limited to, cheating, plagiarizing, […], facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with academic work of other students. […] A student charged with academic dishonesty will be given oral or written notice of the charge by the instructor. If students believe that they have been falsely accused, they should seek redress through informal discussions with the instructor, the department head, dean or campus executive officer. If the instructor believes that the infraction is sufficiently serious to warrant the referral of the case to Judicial Affairs, or if the instructor will award a final grade of F in the course because of the infraction, the student and instructor will be afforded formal due process procedures.
From Policies and Rules, Student Guide to the University Policy 49-20

In cases where academic integrity is questioned, requires that the instructor give the student notice of the charge as well as the recommended sanction. Procedures allow the student to accept or contest the charge through discussions with the instructor. Please see the Eberly College of Science Academic Integrity homepage for additional information and procedures.

Additionally, students enrolled at Penn State University are expected to act with civility and personal integrity; respect other students' dignity, rights, and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts. An environment of academic integrity is requisite to respect for self and others, and a civil community.

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Disability Services

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at http://equity.psu.edu/ods. In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at http://equity.psu.edu/ods/guidelines). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.

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