

# MTH 141 Introductory Calculus – Fall 2016

Instructor:

Section/Meets

Office Hrs:

Textbook: Calculus: Single Variable, by Hughes-Hallet et al, **6th ed.**, Wiley.

Also needed: access code to WileyPlus (included in new books)

Calculator: Not required, and not allowed in tests

Prerequisite Precalculus MTH111 with C-, or passing a URI placement exam

**About the course** The language of science is mathematics, and calculus is an indispensable part of everyday calculations used in science, technology, engineering, mathematics, and other fields. MTH 141 is the first calculus course for students in these areas. This course will make precise and deepen your understanding of fundamental concepts such as *change*, *limit*, and *rate*. You will apply differential calculus to problems in the physical and biological sciences involving *optimization*, *motion*, and *growth*. You will also receive an introduction to integral calculus, which will be further developed in subsequent courses. At the end of the semester you will be able to calculate with and apply differential calculus concepts and methods, including limits, continuity, derivatives, optimization, integration as a limit of sums, and the Fundamental Theorem of Calculus. In addition, you will have an understanding of mathematical modeling concepts and numerical issues

## Evaluation

Three exams @ 13.33% each	=	40.0 %	(6:30 p.m. on Oct 5 <sup>th</sup> , Nov 2 <sup>nd</sup> , Dec 5 <sup>th</sup> )
WILEYPLUS Homework	=	7.5 %	
Mathematica Homework	=	7.5 %	
Class work	=	15.0 %	
Final exam	=	30.0 %	
TOTAL	=	100.0 %	

Letter grades:

A (92% - 100%)	A- (90% - 91%)	B+ (87% - 89%)	B (82% - 86%)	B- (80% - 81%)	C+ (77% - 79%)
C (72% - 76%)	C- (70% - 71%)	D+ (67% - 69%)	D (60% - 66%)	F (0% - 59%)	

- Calculators are not allowed in all major tests. Exams are common to all sections, and given in the evening, outside normal class time.
- WileyPlus is a computer homework system. The system will record your answers and keep track of your WileyPlus homework grades.
- Mathematica is a computer algebra system. URI students can download and install the Mathematica software on their personal computers. Mathematica is installed on campus labs. *Mathematica assignments are to be submitted electronically to SAKAI, by using the Assignment tool.* The Mathematica software will be demonstrated in class by your instructor.
- Class Work: (details given in class)
- The Final Exam is cumulative. The date and time will be announced later in the semester.

## General Education Areas

MTH 141 is a General Education course. The General Education areas satisfied by MTH 141 are

- A1. Understand and apply theories and methods of the science technology, engineering and mathematical (STEM) disciplines
  
- B3. Apply the appropriate mathematical, statistical or computational strategies to problem solving.

**MTH 141 Learning Outcomes.** *At the end of the course the student should be able to:*

**1. Limits and continuity.** Select suitable techniques to/and perform analysis and computation of limits by analytic, graphical and numerical methods, and use limits to investigate properties of functions such as continuity and existence of asymptotes. Investigate continuity properties of functions.

**2. Derivatives.** Select suitable techniques to/and perform analysis and computation of derivative at a point using limits, numerical, and graphical methods. State the definition of derivative as a limit of a difference quotient, and use it to establish its value or non-existence. Perform analysis of differentiability of a function at a point or a set of points, using limits, numerical, or graphical methods.

**3. Computing derivatives algebraically.** Select suitable formulas and theorems to/and perform computation of first and higher order derivatives algebraically. Perform computation derivatives of functions defined implicitly.

**Using Derivatives.** Perform analysis and computation using differentiation to/and investigate velocity, acceleration, related rates, monotonicity, optimization problems, linear approximation, limits (L'Hopital's rule), and functions defined parametrically. Apply theorems about continuous and differentiable functions (Extreme Value Theorem, Mean Value Theorem, Rolle's Theorem).

**5. Integration.** Select appropriate technique to perform analysis and computation using Left and Right Riemann sums to approximate integrals. Select suitable formulas and theorems to/and calculate anti-derivatives, and verify answers by differentiation. State the First and Second Fundamental Theorem of Calculus and use it to compute integrals of simple functions, and apply them to total change. Use integrals to compute area of planar regions bounded by simple functions.

**6. Modeling, Approximation, Technology.** Select calculus methods and use technology to analyze mathematical models and determine their applicability. Use technology to analyze accuracy of approximations, perform numerical and symbolic calculations, and produce graphical representations of functions to investigate their properties.

**7. Written Mathematical Communication.** Communicate effectively in written form mathematical ideas and solutions, by stating in a complete, clear, concise, and organized manner steps, calculations, solution strategy, conclusions, and when appropriate, interpreting results in practical or applied terms.

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**Course Goals** The goals of the course are:

1. Provide an introduction to one-variable Calculus, which is essential to natural and mathematical sciences, engineering and other areas.
2. Expose students to mathematical concepts and provide mathematical skills needed in their area of specialization
3. Provide a bridge for the student from high-school or lower-division mathematics courses to upper-division mathematics.
4. Help students to become effective mathematics problem solvers, specifically help them to
  - a. Understand concepts rather than merely mimic techniques
  - b. Demonstrate understanding through explanation
  - c. Understand the relationship between a process and the corresponding inverse process
  - d. Select between formal and approximate methods for solution of a problem, and make judgments about the appropriateness of the choice
  - e. Select the proper mathematical tool or tools for the task at hand

**Special Needs** Any student with a documented disability is welcome to contact the instructor as early in the semester as possible so that reasonable accommodations may be arranged (contact Disability Services for Students Office at 330 Memorial Union 401-874-2098).

## Expectations

1. You are expected to attend every lecture, and to submit your work on time.
2. It is your responsibility to communicate clearly in writing up solutions for homework, quizzes, and exams. Your results must display your understanding well and be written in a correct, complete, coherent, and well organized fashion. The rules of language still apply in mathematics, and they apply even when symbols are used in formulas, equations, etc. Precise communication and neatness count!
3. The rapid pace of the class requires that you spend time every day doing homework, reviewing notes, reading the textbook, and working out extra problems, all in addition to the time spent in class.

**Academic Honesty** Cheating is defined in the University Manual section 8.27.10 as *the claiming of credit for work not done independently without giving credit for aid received, or any unauthorized communication during examinations* (of course, this includes use of the "internet"). Students are expected to be honest in all academic work. The resolution of any charge of cheating or plagiarism will follow the guidelines set forth in the University Manual 8.27.10 - 8.27.20.

**Incomplete Grade** URI regulations concerning incomplete grades will be followed to the letter. See sections [8.53.20](#) and [8.53.21](#) of the university manual.

**Getting started with WileyPlus** WileyPlus will be used for some of your homework assignments. If you took MTH 141 at URI last semester your Wiley-plus registration should continue this semester. If not, you will need to register with Wiley-plus using the license key that came with your textbook.

If you ARE already registered for WileyPlus from MTH141 last term, then go to <http://edugen.wiley.com/> and log in with the same user name and password.

If you ARE NOT registered from last semester then you can either buy a new textbook which comes with an access code for WileyPlus and follow the instruction that come with the textbook OR you can go to [www.wileyplus.com/buy](http://www.wileyplus.com/buy) and purchase a WileyPlus registration which comes with an online textbook.

If you need help registering go to <http://www.wiley.com/college/twomin/stu/register.html>

WileyPlus assignments will be given every week. Due dates for WileyPlus assignments are firm, however students may submit late WileyPlus homework with a 50% penalty.

**Tutoring help:** In addition to your instructor's office hours, there is help available from the Academic Enhancement Center (AEC). The Academic Enhancement Center (AEC) offers three types of help: Supplemental Instruction, Math Walk-In Tutoring Center, and Appointment-Based Math Tutoring. For more details, see [Resources for students](#) in the course's website.

**Standards of Behavior** Students are responsible for being familiar with and adhering to the published "Community Standards of Behavior: University Policies and Regulations" which can be accessed in the University Student Handbook. Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Judicial Affairs for disciplinary action.

**Religious holidays** It is the policy of the University of Rhode Island to accord students, on an individual basis, the opportunity to observe their traditional religious holidays. Students desiring to observe a holiday of special importance must provide written notification to each instructor.

**Grading disagreements.** Rarely, issues arise that may require arbitration. If such an issue does occur, and only after you have initially tried to resolve the issue with your instructor—in a professional and respectful manner—please contact the coordinator of MTH 141.

**Electronic Devices** Cell phones, ipads, ipods, etc. should be turned off during class. Excepted from this are electronic pads used for notetaking. Your instructor may tell you about other exceptions. “texting” is not allowed.

**In class** Please ask questions at any time. We will make an effort to clarify difficult concepts, or to explore any interesting ideas you may offer. Class participation has a positive impact on the student’s learning, and we encourage it.

**Late Work Policy** Late work in Mathematica or in WileyPlus will have a 50% penalty, and must be submitted before the last day of class.

**Tardiness, leaving early** If you must come in late or leave early, let the instructor know before the class.

**Major Test Makeup Policy** Makeup exams may be scheduled in the event you are unable to attend the evening exams under the following conditions. In particular, if you must miss the exam because of a scheduling conflict, you must notify your instructor before, not after, the exam, and emergencies require you to contact your instructor within 24 hours.

- If your reason for missing the exam as scheduled is (i) a University sanctioned event for which verifiable documentation can be provided (including another scheduled class), or (ii) a responsibility to an employer that cannot be rescheduled (with documentation from your employer), then you **MUST INFORM YOUR INSTRUCTOR 48 HOURS IN ADVANCE OF THE EXAM AND PROVIDE DOCUMENTATION IF REQUESTED.** Makeup exams will be scheduled after the actual exam, and preferably before the class period when exams are to be handed back, but no later than one week after the original date.
- If the reason for missing the exam as scheduled is due to (i) illness (with verifiable documentation from a medical provider), or (ii) an emergency (with appropriate documentation), then you **MUST INFORM YOUR INSTRUCTOR WITHIN 24 HOURS OF THE EXAM** and provide documentation upon your return. Failure to notify your instructor within 24 hours will result in a 0 for the exam. No exceptions. Makeup exams may be scheduled no later than a week after the original date, unless the illness or emergency precludes this, in which case the makeup exam will be given on a common date during the last two weeks of the semester.

#### **Test Policy**

- You must have a URI Photo ID with you to take an exam, and show it to the proctor as you hand in your exam.
- No books, bags, papers, extra scrap paper, or anything else may be taken with you to your seat. If you bring any of these items with you, you must leave them at the front of the room.
- No calculators of any kind are permitted on exams.
- No cellphones, MP3 players, or any electronic devices of any kind may be used or even accessible to you at any time during the exam.
- Proctors will not answer any questions concerning the content of exams.
- You may not leave the room during the exam before you are done without authorization from the coordinator. If you leave the room for any reason, your exam will be collected.
- Once finished, you must hand your exam to a proctor (your instructor, if in the room) and show your URI photo ID. You are advised to bring multiple pencils to the exams, just in case. Do NOT use a pen.

***Are you planning to take MTH 142 soon? Recall that a MTH142 pre-req. is C- or better grade in MTH141 !***

# MTH 141 Introductory Calculus – Fall 2016

## MTH 141 Fall 2016 - Calendar

The following calendar gives a timetable for the course. Your class may be slightly behind or ahead at any given time. Some of the problems may be done in class, others as homework. Your instructor will be more specific. You should work out all the problems given below. NOTE: notation like "3-9" means that all problems from 3 to 9 are to be done. Textbook: Calculus: Single Variable, by Hughes-Hallet et al, **6th ed.**, Wiley.

Week	Dates	Sections/Events/Exams	Problems (* = requires technology)
1	Sept. 7   Sept. 9	<b>First Day of Class Wed. Sept. 7</b> (1.1) Functions and Change (1.2) Exponential Functions	(1.1) 1,6,9,12,16*,17,21,26,37,40,43,44*,51,55 (1.2) 5-14,22*,23,30*,35*,37,38
2	Sept. 12   Sept. 16	(1.3) New Functions From Old (1.4) Logarithmic Functions (1.5) Trigonometric Functions (1.6) Powers, Polynomials, and Rational Functions	(1.3) 1,2,3,8,11,13,15,23,24,28-31,36,37,,55 (1.4) 3,7-13,19,20,25,29,30,32*,33*,40*,50* (1.5) 14-19,22-23,27,30,33,39,41,43,44,51 (1.6) 3-10,19-22,36-38,45*,46*
3	Sept. 19   Sept. 23	(1.7) Introduction to Continuity (1.8) Limits (2.1) How do we measure speed?	(1.7) 2-7,19-21,24-25,27,32,37 (1.8) 1-3,7-9,12-15,19*,23*,25*,29,31,54-62,64-67 (2.1) 1,3-5,8,9*,14-17,21,23,24*,25-28
4	Sept. 26   Sept. 30	(2.2) The Derivative at a Point (2.3) The Derivative Function (2.4) Interpretations of the Derivative	(2.2) 1,4,10-13,17*,26*,35-38,41-50 (2.3) 1,3,7,9,11,13,15,16,19,21,28,29,31,33,43 (2.4) 1-4,6,9,11,12,18,21
5	Oct. 3   Oct. 7	<b>EXAM 1 6:30pm-8.00pm Wed. Oct 5, Chafee 271</b> (2.5) The Second Derivative (2.6) Differentiability	(2.5) 2-4,8-13,16,18-23,28-31 (2.6) 1-4,6*,9,12,16
6	Oct. 10   Oct. 14	(3.1) Powers and Polynomials ( <i>Oct 10 no class</i> ) (3.2) The Exponential Function ( <i>Oct 12 makeup day</i> ) (3.3) The Product and Quotient Rules	(3.1) 6-47odd,50-55-59,60,63,70,71 (3.2) 1-25odd,40,41 (3.3) 3-29odd,31,32,39-42,45,52,53
7	Oct. 17   Oct. 21	(3.4) The Chain Rule (3.5) The Trigonometric Functions (3.6) The Chain Rule and Inverse Functions	(3.4) 1-55 odd, 57,58,61,62,67,76ab,77 (3.5) 10,11,18,21,27-30,38,42,62 (3.6) 1-8,21-28,43,57-59,63,65
8	Oct. 24   Oct. 28	(3.7) Implicit Functions (3.8) Hyperbolic Functions (3.9) Linear Approximation and the Derivative	(3.7) 1-20odd,26-30,31-33,37 (3.8) 1-11,30 (3.9) 1-7,10,11*,13*,14,20-22,30,31,36,38,39
9	Oct. 31   Nov 4	<b>EXAM 2 6:30pm-8.00pm Wed. Nov 2, Chafee 271</b> (3.10) Theorems about Differentiable Functions (4.1) Using First and Second Derivatives	(3.10) TBA (4.1) 1,4-14,16-19,28-29,33,38-40
10	Nov. 7   Nov. 11	(4.2) Optimization (4.3) Optimization and Modeling <i>Nov. 11 no class- Veterans Day</i>	(4.2) 1-25odd,27,28,29*,36 (4.3) 1-9 odd, 17, 20-21, 28-30
11	Nov. 14   Nov. 18	(4.6) Rates and Related Rates (4.7) L'Hopital's Rule, Growth, and Dominance (5.1) How Do We Measure Distance Traveled?	(4.6) 1,2,5,7,11,12,16-19,25-29,33,44 (4.7) 1-8, 16-18, 25-41 odd, 48,49 (5.1) 1-4, 6-12,13,15,17-18,24-25,27
12	Nov. 21   Nov. 25	(5.2) The Definite Integral (5.3) The Fundamental Theorem and Interpretations <b>(No classes Thanksgiving Break Nov. 24 – Nov. 27)</b>	(5.2) 3-4,11-17,19, 22*-28*, 31,32 (5.3) 3-7,9-12,21,31,42 (5.3) 3-7,9-12,21,31,42
13	Nov. 28   Dec. 2	5.4) Theorems About Definite Integrals (6.2) Constructing Antiderivatives Analytically	(5.4) 2-12,13*-17*,21,24,27-30 (6.2) 1-60,65-67,70-71
14	Dec. 5   Dec. 9	<b>EXAM 3 6:30pm-8.00pm Mon. Dec. 5, Chafee 271</b> (6.1) Antiderivatives Graphically and Numerically (6.4) The Second Fundamental Theorem of Calculus	(6.1) 2-9,13-14,17,19,23,25 (6.4) 4-5,11-14,35-38
15	Dec 12	Last Day of Classes – <i>Nov 11 Veterans day makeup day</i>	