

# Ma 1020 Syllabus Fall 2016

last revised August 24 , 2016

## Calculus I with Preliminary Topics

This course has two overall purposes: to have you learn Differential Calculus (the calculus of derivatives) and to review some of the essential math from high school that is needed for this and other math courses. The 14 week time frame allows for both of these to happen at a reasonable rate. Within this, it also should help you to make a successful transition from being a high school student to being a college student

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## **Course Organization, Expectations and Resources**

### **Time Investment**

A reasonable expectation is that you will put in a total of **12-15 hours per week** in all activities to do with this course. This includes, depending on the week,

- doing homework
- coming to class
- studying for quizzes/taking quiz
- labs
- coming in for help – office hours

You have three courses in all, so we are looking at an academic demand on your time of perhaps **45** hours. That's not too bad. There are **168** hours in a week. This means you have plenty of time for things like sleep, exercise, job, eating, socializing, fun and whatever else you like to do.

**Managing your time effectively** is a key part of becoming a successful college student. This includes balancing the demands of 3 courses in parallel. Not letting things go until the last possible moment. Telling me "I didn't get today's homework done because I was studying for a Physics exam" is a sure sign you don't know how to do this. (*yes, I have heard this many times*).

### **Homework**

is due at the start of the next class after it is assigned. As a general rule there will be an assignment due every class. Late homework is not accepted. See the **Math Learning and Content** for more on homework criteria and philosophy.

### **Cell Phones, Ipods et al**

have **no** place in the classroom or lab and are a disruption, Please shut them off prior to class. Calculus (and every other course) requires your attention!

### **Attendance**

- is **mandatory**. You cannot learn if you're not in class!! Furthermore, mathematics is a *sequential* subject. One day depends in part on the day before; miss a day and you have lost the chain of progress.
- Part of the freshman year is becoming a productive and successful student. A part of that is having self discipline and being organized. That includes attending classes.
- Your attention and participation while in class is important as well.

### Special Accommodations

Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Disability Services Office (DSO) as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in the Student Development and Counseling Center and the phone number is 508-831-4908, e-mail is [DSO@WPI.EDU](mailto:DSO@WPI.EDU)

Their website is at <http://www.wpi.edu/offices/disabilities.html>

If you are eligible for course adaptations or accommodations because of a disability (whether or not you choose to use these accommodations), or if you have medical information that I should know about please make an appointment with me asap. The more we communicate, the more we can develop productive conditions for you.

### Plagiarism

*is the act of representing someone else's work as your own.* Examples of this include, but are not limited to,

- copying someone else's homework or exam
- copying from a solutions manual
- representing online materials as your own
- communicating with someone during an exam – verbally or looking at their paper
- using the Internet but failing to cite your source

Each student is expected to familiarize him/herself with WPI's Academic Honesty policies which can be found at

<http://www.wpi.edu/offices/policies/honesty>

All acts of fabrication, plagiarism, cheating, and facilitation will be prosecuted according to the university's policy. If you are ever unsure as to whether your intended actions are considered academically honest or not, please see Prof. Goulet. In general, **when in doubt, give credit!**

### Staff

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### **Weekly Schedule:**

**Monday, Tuesday, Thursday** – class

**Friday:** lab or quiz – alternating weeks first quiz 9/9

### **Office Hours** *Welcome!*

Monday 10 – 12

Tuesday 10 – 12

Thursday 10 – 12, 2-4:00

Friday 9 – 12:00

or by appointment.

*Please make use of office hours!* In the best of worlds, each of you would have your own personal instructor for each course. One-on-one. Unfortunately, there aren't enough instructors nor enough money to afford one-on-one. So a class with 25 people in it is a compromise of sorts. But you can come in during office hours and work one-one-one. Furthermore you get to dictate the topic. Whether it is a class topic that did not make sense, homework, preparation for a quiz, or just to find out how you are doing, please stop by. Almost always this is a very productive experience. If you are stuck in some area, I can usually figure out what the problem is in a couple minutes and begin to remedy it, whereas you might spend hours on your own. Sometimes merely formulating a good question causes people to figure out what their problem is. In any event, communication is a good thing!

If that doesn't do it, you can at least partake of free chocolate and other goodies available. ☺

I am in Stratton 201A. One floor below the classroom.

### **Calendar**

The undergraduate calendar is at

[https://www.wpi.edu/Images/CMS/Undergraduate/UG\\_16-17\\_with\\_summer\\_FINAL.pdf](https://www.wpi.edu/Images/CMS/Undergraduate/UG_16-17_with_summer_FINAL.pdf)

Note there is no calculus class during **term break**, October 14-264 (and there is no “mid term grade” or “mid term exam” or grade).

## Final Exam

In class, **Tuesday December 13.**

## Mathematics Learning

### Homework

Homework is a step in the process of learning math. Please view it that way and not as a means of “getting points” . It can either help you or you can render it meaningless by treating it as a nuisance to be done with as little effort and thought as possible. If it were possible to learn math without it, people would be doing that. *But they're not!*

It is collected at the start of class on a daily basis. When it is assigned (on Blackboard), it is assumed to be due at the beginning of the next class, whenever that occurs.

**Format:** please follow the following if you wish to have yours graded and counted –

- a) **name, ma 1020 and Homework #** in the upper right hand corner
- b) 8.5 x 11 paper *not* torn out of a spiral binder
- c) work done neatly with the steps leading to your answer clearly laid out
- d) pages *stapled* together (buy a stapler!)

We reserve the option to return any homework ungraded which does not follow these requirements. We have a lot of papers to read and process and cooperation is needed to have this work. What passed for acceptable homework in high school may be seen by us as only a first draft and be in serious need of more neatness or attention to detail (*guys*, take note!). Take it seriously, don't “go through the motions”.

You will probably need more **time** than you put in, in high school. Typically in high school people report spending about 45 minutes on an assignment with a minute or so on each problem. Try doubling those expectations. Things that will require more time might include

1. adding all the steps to arrive at a justifiable answer
2. going back to a problem you could not do the first time
3. copying your work over so it is neater and more readable. (if you make a mistake, please do not simply cross it all out and add new work. Get a new sheet of paper and redo it. Use a pencil! We all make mistakes. )

You will probably turn in 35 to 40 assignments during the course so if you develop good habits early on, they will pay off.

I go over homework at the start of each class - - - whatever problems people have questions on. When you come into class, have a list of problems you would like discussed and tell me. If you can't do a problem or are not sure of the results, you have an obligation to find out about it for your own benefit.

As above, **we don't accept late homework**. Your responsibility is to get it done and done on time. The old excuses like "I overslept", "I was studying for a Physics test" , "I didn't feel good" , "My roommate ate my homework" don't get you out of the responsibility. You were accepted to college in part because you are believed to be a responsible, productive student.

## Grading

### Homework

See extensive comments below. Graded on a **0-10** basis. Not all problems may be graded; sometimes the ones graded will be randomly selected. Read the comments made! They are for your good. **We don't accept late homework**. Get it done on time!

### Quizzes

My grading system is unusual so please make an attempt to understand it. First, you either pass a quiz and receive a grade, or the work is not yet acceptable and the quiz must be retaken. To pass the course, all quizzes must be passed. (to quote some movie, "failure is not an option"). Sometimes it simply takes more than one try to get things straightened out. It took Robert Goddard some 238 tries to get a liquid fuel rocket off the ground! *Perseverance* is a valuable characteristic in life! Math and Science are not easy.

A passing quiz will have received a grade from **6** to **10** points which reflects the overall level of achievement on it. A quiz which is not acceptable will have the word **No** on it in place of a grade. In the latter case it becomes your job to figure out what was wrong and to improve accordingly. You can then take a makeup quiz. The grade on that makeup quiz is then your grade. There is no penalty for having not passed a quiz on the first try. There is, by the end of the course, not even a record that it happened. Temporarily a **0** will show up in the Grade Center until a makeup is passed.

There will be, after a few weeks have passed , a **makeup session** for retaking quizzes. Probably Wednesday evenings. You simply show up and indicate what quiz you wish to retake. If you have already passed a quiz, you cannot retake it. The grade you get on the makeup quiz is your grade - - there is no record of the original quiz.

## Course

*Once you have passed all the quizzes*, your grade for the course is determined by the following weights:

**all quizzes 50%**

**homework 20%**

**labs 15%**

**final exam 15%**

with the overall score used to assign:

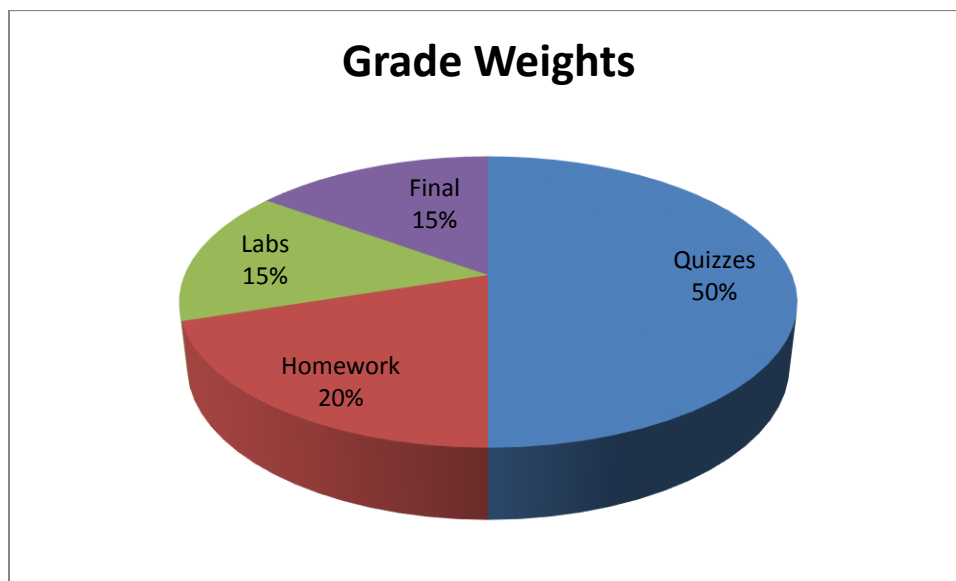
**A:** 90 – 100

**B:** 80 – 89

**C:** 79 or below

If you do not pass all the quizzes then you receive an **NR** for the course. This should not happen.

For those of you who like something more visual:



*Borderline scores:* if someone ends up with a score just below 80 or just below 90, I look for ways to bump them up to the next letter grade. Things that *might* make a difference include: strong final exam (no one gets lucky on a final), noteworthy effort, really good work on one of the harder areas, or others.

## Textbook

*Calculus and Analytic Geometry* by George Thomas, 13<sup>th</sup> edition

## Learning Math

Learning mathematics takes place in a number of forms and at a number of levels. They might be seen as:

**knowledge – facts.** In math this is information you need to **know** and carry with you. Examples are

- Pythagorean Theorem
- Quadratic Equation
- Area of a circle or triangle
- What a log is
- Values of Sine and Cosine
- Rules of Exponents
- Rules of Differentiation

These involve memorization. Knowing “about” something is not the same as “knowing” it.

### skills

You need to be able to *do* problems. Factor expressions, sketch graphs, simplify expressions, find derivatives, stuff like that. You develop these through practice and thinking. There are no shortcuts. If there were, I’d tell you! You probably have a driver’s license. It is much easier to *describe* parallel parking than it is to actually *do* it. But you only get a license when you demonstrate that you can really do it.

Doing problems correctly comes from understanding the process involved and correctly *using* it. Steps matter. They should be clear and explainable. Guessing or remembering patterns from similar problems are of no value. Approaches you took to getting through standardized tests in high school may no longer be of value.

You need to not only arrive at a correct answer but *also* be able explain and defend your answer. This may be a new expectation for some of you. The top of any quiz will have the statement “**please show all work leading to your answer. Answers alone will be ignored**”.

### concepts

This has to do with a fundamental *understanding* of what is going on. All math and science have underlying concepts that need to be paid attention to, or the work is meaningless. What are you trying to do when you *solve* an equation? What does a *slope* mean? What is a *root*? If a derivative has a value of +3 what does that *tell* you? What *is* a circle?



## **applications**

if you understand calculus and have the related skills then you are in a position to apply it. Few, if any of you, are math majors so your practical use for calculus is in *applying* it as your other courses demand.

## **Quizzes**

are in labs every other Friday (SH 003). Sample Quizzes will be posted in Blackboard well in advance, usually with solutions. Notes and calculators are not allowed during quizzes. There will probably be 6 quizzes during the course.

## **Content of Course**

### **Preliminary Topics to Be Covered**

estimated number of classes in parentheses

#### **Analytic Geometry (4)**

Pythagorean Theorem  
straight lines  
    slope-intercept, point-slope  
parabolas  
circles

#### **Algebra (5)**

exponents  
binomial expansions  
series  
completing the square  
factoring  
roots  
logs and exponentials

#### **Trigonometry (3)**

right triangle trig  
periodic functions

#### **Functions (2)**

domain and range  
graphs  
piecewise  
composition  
inverses

## **Calculus**

### **limits (4)**

including one sided, at infinity  
geometric series  
 $\sin(\theta)/\theta$  as  $\theta \rightarrow 0$   
numerically determined

### **derivatives (6)**

secant and tangent lines  
concept of a derivative  
by the definition  
rates of change  
approximations of function change  
notation  
applications  
derivatives as slopes; as rates; as velocity and acceleration

### **differentiation methods (8)**

basic rules  
quotient, product rules  
linearity  
chain rule  
transcendental functions  
trig, logs, exponentials  
implicit differentiation

### **second derivatives (3)**

concavity, points of inflection, curve sketching  
bell shaped curves

### **applications (6)**

max/min problems  
graphs

related rates

## Class

Roughly speaking, each 50 minute class is broken up into 3 segments. My goal is to make this 50 minutes as efficiently used and productive time as possible. The three segments are:

1. going over select problems from the **homework** which was just turned in (**you** need to provide me with the questions you want reviewed)
2. going over **new material** – short lecture with key examples. Either take notes or download my notes later on.
3. **students working on problems** based on new material.
  - a. talking to each other encouraged
  - b. activity based. Don't just sit there! Try and take things away, try and contribute. Be yourself! Get involved.

Optionally there may be discussion of an upcoming **quiz** as questions from you dictate.

Notice that 2 out of the 3 segments heavily depend on *you*, the student.