

## Calculus II

Math 106

*Spring 2018*

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### Welcome!

Welcome to Calculus II! This is the continuation of Calculus I. Topics will include: Approximation of Functions, Series and Sequences, Test for Convergence and Divergence of Series, Riemann Sums, Anti-derivatives, Definite and Indefinite Integrals, Techniques of Integration, Applications of the Integral. We will use graphing calculators, apps like desmos or wolfram alpha on a regular basis. Students will develop a conceptual understanding of the course material in an inquiry-based classroom, which includes a lot of independent work, group work and presentations. There will be no traditional lecture. We will use textbooks only as outside resources. We use the free online calculus text Active Calculus by Matthew Boelkins at <http://scholarworks.gvsu.edu/books/10/>.

Mathematics can be fun and challenging at the same time. Westfield State defines a credit hour as “one hour of classroom or direct faculty instruction and a minimum of two additional hours of student work each week for approximately fifteen weeks for one semester.” Since this class is a 4-credit class, you are expected to spend at least 8 hours per week working on calculus outside of class. This includes time spent meeting with me outside of class during my office hours, or by appointment, whenever you have questions.

**As your instructor, it is my belief that hate, racism, sexism, and other forms of discrimination are immoral and have no place on our campus or in our society.** Our class is one community. We learn together. We work together. And we will respect one another. I teach all students, regardless of background or beliefs. All students are equally welcome and valued. No one is being asked to leave the table. Everyone is being asked to make room at the table, so that everyone has a seat and a fair chance.

### PLATO

We will use a PLATO site for our class to collect some of the homework, to report grades and for additional resources. Please go to PLATO from [www.westfield.ma.edu](http://www.westfield.ma.edu) and log into our class to find your assignments and grades.

### Attendance

Exploration, collaboration, and communication in class are essential for this course. Therefore, attendance is mandatory and active participation contributes to your grade. *If you have to miss class, contact me to make arrangements to present the missed work to*

*me*. No make-ups will be given for missed exams, except in the event of a true, documented emergency where I am notified in advance--if possible. In such a circumstance, it is your responsibility to contact me to make alternate arrangements.

### **Homework Stories**

There will be homework, so called homework stories, on a regular basis. If you are absent, you are expected to find out about the assignment and complete it prior to the due date. Please see the separate writing rubric for requirements and expectations of homework stories. You should expect to spend at least 2-3 hours of homework every week. Late work will only be accepted if you check in with me about it and we agree on a new due date.

### **Journals**

There will be three journals during the semester in which you will reflect on your current beliefs and attitudes toward mathematics. Detailed rubrics will be handed out in class.

### **Notebook**

I suggest writing all your thinking work during class and outside of class in a notebook or to collect them in a binder. This will allow you (and me) to see how you progress in your thinking and how much effort you put into your work. This notebook/binder is not meant to contain "perfect work" but instead all you attempt, thinking and mistakes. Work that you hand in has to be written up separately.

### **Technology**

You do not need a *specific* graphing calculator for this course, but you need to have either a graphing calculator or a graphing calculator app on your phone available for class and at home. I also suggest getting the free apps *desmos* and *geogebra* app for graphing and the (cheap) *wolfram alpha* app for many other calculations. There is a general wolfram alpha app and a special app for calculus, both are great and fairly cheap. You can also bring your laptop or tablet to class to use the (free) wolfram alpha web site. There is also the free app wolfram cloud, see <https://itunes.apple.com/us/app/wolfram-cloud/id978701305>.

### **Webwork:**

There will be 7 webwork assignments (<https://webwork.westfield.ma.edu/webwork2>) to login use your westfield username and password). They will help you practice procedures. You have as many attempts as you like. You pass the assignment if you get all answers correct (possibly taking several attempts). You need to have completed the assignment 7 days after it was assigned.

### **Academic Honesty**

Anyone detected cheating in an exam, the final examination, or the collected exercises, whether aiding or being aided, will receive a zero for that exam or exercise. I encourage you to seek assistance on homework assignments whenever there is a need: in my office, at the tutoring center, or with fellow students. However, one should not simply copy somebody else's work. What you write on your paper should always reflect your understanding of the material. If you were helped in a substantial way, note your helper's

name next to the assignment. (Ideas for this syllabus, for instance, are owed to my colleagues Volker Ecke, Phil Hotchkiss and Stan Yoshinobu)

**“Help!”** You are warmly invited to come and see me whenever you are faced with questions, confusion or concerns -- or to share an exciting discovery. Office hours are times when I'm available *specifically for you*. Please do take advantage of this opportunity. In addition, if my office door is open throughout the week: you are welcome to check in for help on those occasions, as well. If our schedules don't match, email or skype is a good way to get in touch: feel free to suggest a few times that would work for your schedule and we can make special arrangements.

### **Preparation**

You are expected to come prepared to every class. I will start every class by walking around to check if, indeed, you put in effort outside of class. You should expect to spend at 2-3 hours of preparation every week.

### **Anti-derivative Test**

In order to pass the course you have to pass the anti-derivative test. On this test you can show that you have the computational skills and memorized rules necessary to compute derivatives.

### **Class Participation**

We will work on investigations in class, in groups, and on the blackboards. You are expected to prepare for class, contribute and discuss meaningfully, communicate with your group, and present your group's material to the rest of the class. The following list contains 9 elements of successful participation:

Stay <b>focused</b> on doing mathematics during class.
Be <b>prepared</b> for class. This means you do all assigned problems/tasks and email me if you get stuck.
Work constantly at your <b>learning edge</b> . This includes that if you are behind many other students you will come to office hours to catch up and if you are ahead of the class you are ready to work on extension questions.
Give your best <b>effort</b> in solving the mathematical investigations. This includes being persistent even if you feel frustrated at times. It also includes making mistakes, and learning from them.
Ask all your <b>questions</b> (to students and/or instructor).
Actively and respectfully <b>listen</b> to students and instructor.
<b>Communicate</b> about mathematics positively and meaningfully in your group. This means that your comments are relevant and reflect understanding of the material and previous remarks from students. Communicate at appropriate times -- not too little and not too much.
Communicate about mathematics positively and meaningfully in <b>whole class discussions</b> .
Be <b>reflective</b> about yourself as a learner. Change your perception of

doing mathematics if applicable.

**Exams:**

There will be a midterm exam and a final exam. The date for the midterm exam will be announced during the semester, the final exam will take place during the time and place assigned by the university during finals week.

**Grading:**

For an A you need to do **all** of the following:

- Participate at A level (9 elements of successful participation are present)
- Pass 12 homework stories.
- Pass 3 journal entries.
- Present one productive mistake to the class.
- Pass the anti-derivative test
- Pass 6 webwork assignments at 90% each.
- Pass the exams at 85% each.

For a B you need to do **all** of the following:

- Participate at B level (8 elements of successful participation are present)
- Pass 11 homework stories.
- Pass 3 journal entries.
- Present one productive mistake to the class.
- Pass the anti-derivative test
- Pass 5 webwork assignments at 90% each.
- Pass the exams at 80% each.

For a C you need to do **all** of the following:

- Participate at C level (7 elements of successful participation are present)
- Pass 10 homework stories.
- Pass 3 journal entries.
- Present one productive mistake to the class.
- Pass the anti-derivative test
- Pass 4 webwork assignments at 90% each.
- Pass the exams at 75% each.

For a D you need to do **all** of the following:

- Participate at D level (6 elements of successful participation are present)
- Pass 9 homework stories.
- Pass 2 journal entries.
- Pass the anti-derivative test
- Pass 3 webwork assignments at 90% each.
- Pass the exams at 65% each.

If you do not pass all of the D-requirements, you will receive an F.

**Meta Objectives:**

Upon successful completion of this course students will:

1. Recognize and challenge their own beliefs and feelings about mathematics.
2. Work well with other students.
3. Find work partners that have similar speed, curiosity and learning edge.
4. Gain social competence in negotiating different ways of thinking.
5. Persevere when it gets difficult and frustrating.
6. Be ok making mistakes and learning from them.
7. Be more confident in doing mathematics.
8. Admit not knowing and ask questions to learn.
9. Be prepared and ready to try/learn when coming to class.
10. Realize that mathematics is more about creating and deep thinking than memorizing procedures.
11. Be curious about mathematics.
12. Recognize how they learn best and put a plan into action.
13. Enjoy the challenge of reasoning.
14. Only accept mathematics that makes sense to them.
15. Communicate mathematical ideals in writing and orally.

**Content Objectives**

It is important that students gain a strong conceptual understanding of calculus and its role, as well as the ability to use the methods of calculus to solve problems. Upon successful completion of this course students will be able to:

1. Discuss the relationship between a function and its anti-derivative.
2. Make sense of the First Fundamental Theorem of Calculus.
3. Estimate anti-derivatives numerically, graphically and symbolically.
4. Describe the relation between the definite integral and Riemann sums.
5. Use appropriate tools for computing anti-derivatives such as substitution, integration by parts, partial fractions, and technology.
6. Use integration to solve applied problems.
7. Compute improper integrals and use them to solve applied problems.
8. Determine the limit of a sequence numerically, graphically and symbolically.
9. Describe the relationship and differences between sequences, series and Riemann sums.
10. Determine the convergence or divergence of a series using numerical and symbolic techniques.
11. Determine the power series expansion for a function about a given point.
12. Use power series expansions to integrate functions.
13. Find the Taylor series of a given function and explain how/why Taylor series approximate functions.
14. Use Technology to help solve problems, and estimate, graph or check solutions.

## **Other Support on Campus:**

### **Reading and Writing Center (RWC), Parenzo Hall 218**

The RWC is dedicated to supporting and encouraging all students as they write to communicate their ideas and to discover new ones. Acting as an engaged audience, the RWC staff assists writers on any type of project, in any major, at any stage of the writing process. To make a FREE appointment and to learn more about the RWC's services, including drop-in hours at Ely Library and workshops on a variety of topics, visit the website: [www.westfield.ma.edu/reading](http://www.westfield.ma.edu/reading), stop by Parenzo Hall 218, or call 413-572-5569.

Here are three tips to ensure you get the most out of your RWC session: 1. Make an appointment sufficiently in advance of the due date in order to give yourself adequate time; 2. Bring with you anything associated with the assignment: a copy of the assignment, the course syllabus, previous writing, and relevant research and reading material; 3. Prior to your session, reread your assignment or your draft and identify a particular question or concern for the session. Notice that you will most likely not get feedback about the mathematical ideas during these sessions.

### **The Counseling Center, Lammers Hall, Annex A**

Life at college can get very complicated. Students sometimes feel overwhelmed, and experience a variety of challenges, such as anxiety, depression, relationship difficulties, and/or diminished self-esteem, to give a few examples. However, many of these issues can be effectively addressed with a little help. The Counseling Center helps students cope with difficult emotions and life stressors. The Counseling Center is staffed by experienced, professional counselors, who are attuned to the needs of college students. The services are FREE and completely confidential. Find out more at <http://www.westfield.ma.edu/student-life/counseling-center>, or by stopping by Lammers Hall, Annex A. Please talk to me if you are distressed and you are not sure what to do about it.

### **Support for Students with Disabilities Requesting Reasonable Accommodations**

It is the policy of Westfield State University to provide reasonable accommodations to students with documented disabilities. Students, however, are responsible for registering with the Banacos Academic Center. If you require reasonable accommodations in this class, please make your request with a Banacos advisor in the Banacos Academic Center. Please stop by or write to [banacos@westfield.ma.edu](mailto:banacos@westfield.ma.edu) to set up an appointment. Additionally, I strongly recommend that you make an appointment with me as soon as possible to discuss how we can work best together.

### **Exceptions to Class Rules, Restrictions or Requirements**

Any student may request an exception to the class rules, restrictions or requirements. Please set a time to meet with me during my office hours or send to me an email so that we can discuss your reasons.

### **Academic Skills Program**

The Banacos Academic Center offers FREE Academic Skills workshops and individual sessions open to all students on topics including understanding a syllabus, organizing time productively, making note-taking effective, reviewing grammar, preparing for exams, tackling an assignment, recognizing key concepts in reading, reviewing grammar, preparing for exams and tests, and giving oral presentations. Go online to [www.westfield.ma.edu/banacos/scheduler](http://www.westfield.ma.edu/banacos/scheduler) to register, find the schedule, and sign up for the workshops or sessions. For questions, email to [academicskills@westfield.ma.edu](mailto:academicskills@westfield.ma.edu) or stop by the Banacos Academic Center in Parenzo Hall.

**Common Goods** is a food pantry serving Westfield State University students, faculty, and staff who may be experiencing hunger and are struggling to purchase food. It is a safe, discreet, nonjudgmental, and welcoming space in which to distribute a variety of non-perishable foods and personal care items at no cost. Visitors to the pantry do not need to provide any financial documentation to use this service. Common Goods is housed in the Second Congregational Church on Western Avenue, adjacent to the entrance to the Commuter Parking Lot. For more information and hours, please visit [www.westfield.ma.edu/commongoods](http://www.westfield.ma.edu/commongoods) or email [commongoods@westfield.ma.edu](mailto:commongoods@westfield.ma.edu).

**Best wishes for a successful semester!**