

MAT 241: Calculus and Analytic Geometry II

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Office hours: MWF 1:30-2:30pm, Tue 9-11am

COURSE MEETS Monday, Tuesday, Wednesday, Friday 12:00pm-12:50pm in Swenson 1056

CATALOGUE DESCRIPTION OF THE COURSE

This is an undergraduate course.

This course meets a requirement for the Mathematics major and/or Mathematics minor.

Continuation of MATH 240. Topics include: conic sections; transcendental functions; techniques of integration; indeterminate forms; improper integrals; and infinite series.

MODE OF DELIVERY

This is a face-to-face course.

LEARNING OUTCOMES

This courses assesses for an undergraduate learning outcome.

List each outcome with the related assessment of student learning (add rows as needed).

Outcome	Assessment (i.e. exam, paper, presentation, project)
Creative and Critical Thinking: Students will analyze information to answer specific questions.	Exams, homework problems, and student-instructor interaction.
Master skills as outlined in Appendix A.	Quizzes, class presentations, student-instructor interaction.
Learn the applications of integrals to mathematics and physics and be able to work with infinite series as sums of real numbers and as functions.	Comprehensive worksheets.
Applies an appropriate formal process (or formal language) to write a solution to a given problem and to evaluate the validity and effectiveness of a given written solution.	Quizzes, class presentations, student-instructor interaction and comprehensive worksheets.
Solves multipart problems by performing appropriate analysis and complex calculations	Quizzes, class presentations, student-instructor interaction and comprehensive worksheets.
Demonstrates fluency in the definitions, results, analysis, and reasoning of a given axiomatically defined system.	Quizzes, class presentations, student-instructor interaction and comprehensive worksheets.

COURSE SCHEDULE AND OUTLINE

This course will heavily utilize active learning. Each week, we will spend the first two days summarizing the skills we are learning. Wednesday and Friday will then be group work days. Students will be placed in groups where they will work on exercises on assigned worksheets. The solutions will then be presented either one at a time by students or in a gallery format. The outline for content is included in the list of skills. We will try to cover 2 skills per week, but will not sacrifice group work time for content.

Each week there will be a quiz on the two skills from the previous week. This will be at the beginning of class on Monday. If there is a holiday, it will be at the beginning of class the next class meeting.

COURSE MATERIALS

Textbook: Calculus 8th Edition by James Stewart

ISBN-13: 978-1-285-74062-1

Secondary Testbook: <http://spot.pcc.edu/math/APEXCalculus/book-1.html>

ASSIGNMENTS, ASSESSMENTS AND GRADING

This course will utilize standards based grading. There are 30 skills attached in Appendix A. Your grade in the course will depend on demonstrating mastery in these skills. In order to demonstrate mastery of a skill, you must successfully complete two of the following:

- a correct solution to a skill problem on a quiz,
- a correct solution to a skill problem on an exam,
- present a correct solution to a skill problem during a groupwork day,
- attend office hours and successfully complete a skill problem (this final option is only available for up to 5 skills).

Additionally, there will be comprehensive and application worksheets assigned as homework via our online class portal. There will be 1 per section of the course:

- Logarithmic, Exponential, and Inverse Trig Functions
- Integration,
- Arc Length and Surface Area,
- Polar and Parametric Curves, and
- Sequences and Series.

These are to be submitted on Fridays. I will grade them and return them on Monday. You can then revise them and hand them back in on another Friday. The solutions to these must satisfy the following requirements:

- Solutions use complete sentences and are almost entirely free of grammatical errors.
- Solutions are clear and concise with all work and logical steps indicated.

The grades in the course are based on the following Rubric:

A	B	C	D	F
Mastered Skills: 27 Comprehensive: 3 Applications: 2	Mastered Skills: 24 Comprehensive: 2 Applications: 2	Mastered Skills: 21 Comprehensive: 2 Applications: 1	Mastered Skills: 18 Comprehensive: 1 Applications: 1	Not meeting D criteria

EXPECTATIONS OF STUDENTS IN REGARDS TO ATTENDANCE AND PARTICIPATION

Attendance will be taken, but is not factored into your grade. It is crucial you attend the group work sessions in order to learn the material. If you do not attend the group work sessions, you miss out on valuable opportunities to earn mastery credit for skills and learn the material more deeply.

Further, I will not post notes from class online. If you miss a day of class and want the notes, you should contact a fellow classmate.

HOW TO SUCCEED IN THIS COURSE

Since the layout of this course is likely different from many of your past courses, I have included some suggestions on how to ensure you are keeping up with content and best utilizing your time and resources.

- Start the comprehensive homework early. Mathematics often takes a long time. It may take time to see a trick, or think through a particularly complex step. If you see the problems and think a small amount at a time, you can do micro-processing while you are doing other things! Multitasking for the win!
- Read the relevant sections of your book before class, and re-read your notes often. Mathematics is extremely definition driven. If you do not know the definitions, you will not be able to do the assigned exercises.
- DO NOT WAIT to seek clarification, hints, or help. You can ask any questions on our class discussion board on Piazza (see below). I encourage you to attend office hours, schedule group study sessions, and work on practice problems.
- Utilize the attached progress sheet to be aware of skills in which you still need to demonstrate mastery. You can bring this to exams if you would like to be sure you are using your time wisely. You can also check on D2L where I will record that you have mastered a skill.
- Be sure you are fully learning the skills you need. This course is different than one where partial credit is given. As such, when doing practice problems and homework it is never a good idea to stop a problem and assume you know how to proceed. Finish your problems and be sure they are correct.
- If you need extra help beyond what I or classmates can give, such resources can be found at: <https://www.uwsuper.edu/about/academic-support.cfm>

COURSE DIALOGUE AND QUESTION BOARD

For this course we will utilize an online discussion board in lieu of email for all course content and structure questions. You can post anonymously (hiding your identity from other students, me, or both) and can type mathematics (ask me to teach you how!).

The forum is available here: <https://piazza.com/uwsuper/fall2018/math241/home>

At the beginning of the course you will be asked to sign up. It is free and required. I will redirect all email questions to Piazza. I will check it regularly, and all students will benefit from the experience.

I HIGHLY encourage you to answer mathematics questions on Piazza. If you do so using your name, I will use thorough answers (at my discretion) as evidence of mastery. It is also a great way for me to understand your abilities if you ever want a recommendation letter.

RULES OF ENGAGEMENT

Since the course will involve a great deal of discussion and group work, there are some rules which we must all abide by in order to have our time be productive and enjoyable for all.

1. All humans are accepted members of our classroom.
2. Assume positive intent.
3. Share talking time.
4. Listen to understand.
5. Be present.
6. Critique ideas, not people.
7. Everyone has expertise. We can learn something from everyone.
8. Share a feeling of mutual responsibility for each other.

UNIVERSITY INFORMATION

DIVERSITY AND INCLUSION AT UNIVERSITY OF WISCONSIN - SUPERIOR

Diversity and inclusion is integral to the educational mission of the University of Wisconsin-Superior. As a community we commit to recognize, include and value inherent worth and dignity of each person; foster tolerance, sensitivity, understanding, mutual respect, and justice among its members; and encourages each individual to strive to reach their own potential. The institution recognizes these experiences are crucial for developing the requisite skills to thrive as a member of a pluralistic society and as a responsible global citizen.

In pursuit of its goal of inclusive excellence, the University actively seeks to attract students, faculty, and staff from diverse backgrounds and life experiences, including but are not limited to: race, ethnicity, sex, gender identity, gender expression, sexual orientation, age, socio-economic background, cognitive ability, physical ability, religion and spirituality, value system, national origin, immigration or refugee status, veteran status, and political beliefs.

The University believes that diversity among its members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. The University of Wisconsin-Superior views, evaluates, and treats all person in any University related activity or circumstance in which they may be involved, solely as individuals.

For more information about Equity, Diversity and Inclusion and/or to report bias, discrimination or harassment, please email edi@uwsuper.edu or call 715-394-8015.

POLICIES AND PRACTICES TO HELP YOUR LEARNING AND GROWTH

The University of Wisconsin-Superior is dedicated to a safe, supportive and nondiscriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding special accommodations, academic misconduct, religious beliefs accommodation, discrimination and absence for University- sponsored events.

Please review the Student Information Sheet and Syllabus Attachment which can be accessed at

<https://www.uwsuper.edu/deanfaculties/forms/index.cfm>. This includes policies related to:

- **Student characteristics**, including policies and services related to those who are active military/veterans, those who are pregnant or expecting new family members, and students seeking services for differing abilities and accommodations student services, and others.
- **Academic integrity**, including information on plagiarism and steps that an instructor can take.

- **Campus policies**, including how to sign up for Safe Alerts, information on course evaluations, process for submitting a formal grievance regarding academics and/or discrimination, and others.

Appendix A: Key Skills

S1	Student is capable of applying substitution to integrate functions of the form: $f'(g(x))g'(x)$ e.g. $\int 2x\cos(x^2)dx$
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LET2	Student is capable of differentiating and anti-differentiating logarithmic functions.
LET3	Student is capable of differentiating and anti-differentiating exponential functions.
LET4	Student is capable of differentiating and anti-differentiating inverse trigonometric functions.

I5	Student is capable of applying integration by parts to integrate functions of the form: $f(x)g'(x)$ e.g. $\int 2x\cos(x)dx$
I6	Student is capable of applying trigonometric substitution to integrate functions involving radicals of sums and differences of squares e.g. $\int \frac{x^3}{\sqrt{x^2-4}} dx$
I7	Student is capable of applying the methods of partial fractions to integrate rational functions e.g. $\int \frac{x+2}{x^2-x-1} dx$
I8	Student is capable of applying two or more techniques to integrate more complex functions.
I9	Student can apply techniques from I1-I5 along with the Fundamental Theorem of Calculus to evaluate definite integrals
I10	Student can apply the definition of an improper infinite integral to determine if said integral converges or diverges.

A11	Student is capable of setting up and evaluating integrals for arc length of a curve given by $y=f(x)$ or $x=g(y)$.
A12	Student is capable of setting up and evaluating integrals for the surface area of a surface obtained by rotating a curve given by $y=f(x)$ or $x=g(y)$ about the x or y axis, including choosing an appropriate variable of integration.

P13	Student is capable of finding tangent lines to parametric curves.
P14	Student is capable of finding arc length and area enclosed by parametric curves.

P15	Student is capable of finding tangent lines to polar curves.
P16	Student is capable of finding arc length and area enclosed by polar curves.

S17	Student is capable of finding the general term of a sequence.
S18	Student is capable of determining the limiting behavior (convergence/divergence) of an infinite sequence.
S19	Student is capable of finding the first few partial sums of a series.
S20	Student is capable of identifying a geometric series and determining its limiting behavior.
S21	Student is capable of applying the divergence test to conclude divergence of a series.
S22	Student is capable of applying the Comparison Test to determine/prove convergence/divergence of a series.
S23	Student is capable of applying the Limit Comparison Test to determine/prove convergence/divergence of a series.
S24	Student is capable of applying the Integral Test to determine/prove convergence/divergence of a series.
S25	Student is capable of applying the Alternating Series Test to prove convergence of a series.
S26	Student is capable of estimating the sum of an alternating series to a particular degree of accuracy.
S27	Student is capable of applying the Ratio Test (and others if needed) to determine/prove the absolute convergence/conditional convergence/ divergence of a series
S28	Student is capable of writing functions as power series using the geometric series formula.
S29	Student is capable of finding the Radius and Interval of convergence of a power series.
S30	Student is capable of finding the Taylor Series of a function using a known series expansion (e.g. $e^x, \sin(x), \cos(x)$)
S31	Student is capable of finding the (first few terms of the) Taylor Series of a function using Taylor's formula (or the entire Taylor Series in the case of a polynomial).

Appendix B: Progress Worksheet

Skill S1 is required:

Logarithmic and Exponential Functions	LET2: <input type="checkbox"/> LET3: <input type="checkbox"/> LET4: <input type="checkbox"/>	Comprehensive: <input type="checkbox"/>
Integration	I5: <input type="checkbox"/> I6: <input type="checkbox"/> I7: <input type="checkbox"/> I8: <input type="checkbox"/> I9: <input type="checkbox"/> I10: <input type="checkbox"/>	Comprehensive: <input type="checkbox"/>
Arc Length and Surface Area:	A11: <input type="checkbox"/> A12: <input type="checkbox"/>	Comprehensive: <input type="checkbox"/>
Polar and Parametric Curves:	P13: <input type="checkbox"/> P14: <input type="checkbox"/> P15: <input type="checkbox"/> P16: <input type="checkbox"/>	Comprehensive: <input type="checkbox"/>
Sequences and Series:	S17: <input type="checkbox"/> S18: <input type="checkbox"/> S19: <input type="checkbox"/> S20: <input type="checkbox"/> S21: <input type="checkbox"/> S22: <input type="checkbox"/> S23: <input type="checkbox"/> S24: <input type="checkbox"/> S25: <input type="checkbox"/> S26: <input type="checkbox"/> S27: <input type="checkbox"/> S28: <input type="checkbox"/> S29: <input type="checkbox"/> S30: <input type="checkbox"/> S31: <input type="checkbox"/>	Comprehensive: <input type="checkbox"/>

Progress Tracker: (Hint: Use Pencil!)

Skills Mastered: (_____ / 31) Comprehensive: (_____ / 5) Applications: (____ / 2)

A	B	C	D	F
Mastered Skills: 27 Comprehensive: 3 Applications: 2	Mastered Skills: 24 Comprehensive: 2 Applications: 2	Mastered Skills: 21 Comprehensive: 2 Applications: 1	Mastered Skills: 18 Comprehensive: 1 Applications: 1	Not meeting D criteria