For students

This is a template syllabus. This file contains course specific information, such as catalog description, goals and objectives, which does not change. The parts highlighted in red are to be determined by the individual instructors. The official syllabus for each section will be provided by the instructor in the beginning of the semester.

MATH 3550

SYLLABUS Fall 20xx

The University of Iowa
The College of Liberal Arts and Sciences
Department of Mathematics

Engineering Math V: Vector Calculus MATH 3550: xxxx

Time & Location for Lecture: xxxx

Some of the policies relating to this course (such as the drop deadline) are governed by its administrative home, the College of Liberal Arts and Sciences, 120 Schaeffer Hall.

Prerequisites: MATH:1560 and (MATH:2550 or MATH:2700)

Approved GE: None.

Instructor:
Office location and hours:
Phone:
E-mail:
Website address:
TA: None
Supervisor: For this course, see the DEO.
DEO Contact Information: Professor …, 14 MLH, 319-335-0714, …@uiowa.edu

Description of Course:

Topics include partial derivatives, max-min problems, integrals along curves, surfaces and solids, Stokes' Theorem and the Divergence Theorem and classical partial differential equations. There are usually two or three hour-long exams and a comprehensive final exam. Depending on the instructor, part of the grade may also depend on homework or quizzes. Although the course is part of the engineering sequence, it is not restricted to engineering students. The course is taught by faculty.

Objectives and Goals of the Course: The objectives of a student taking MATH:3550 are to gain an understanding of concepts and techniques of multivariate and vector calculus appropriate to an engineering curriculum.

MATH:3550 Vector Calculus is the final course in the engineering mathematics sequence. In this course, many of the topics studied in earlier courses are considered in a multi-variate setting in 2 or 3 dimensions. The course begins with definitions and concepts of limits and differentiation for multivariable functions, including partial derivatives, the chain rule, directional derivatives and gradients, and critical points and extreme values. Double integrals and applications are studied in rectangular and polar coordinates, followed by triple integrals in rectangular, cylindrical, and spherical coordinates. Applications of multiple integrals include area, volume, centers of mass, moments and others. The course turns next to important topics in vector calculus. After introducing line integrals, we consider vector fields, potential functions and work. We study the concept of path independence and conservative fields leading up to Green's Theorem in the plane. Following this, we move to three dimensions and consider parameterized surfaces, surface integrals, Stokes' Theorem, and the Divergence Theorem.

Required text: (Check the current textbook from Department Webpage)

https://math.uiowa.edu/undergraduate-program/course-information/book-list

The textbook used in 2018: *Calculus Early Transcendentals, A Custom Edition by* Edwards and Penny. PDE Supplement: Chapter 10 of 11th Edition Boyce and DiPrima, Elementary Differential Equations and Boundary Value Problems. This is the textbook we used for MATH:2560 for many years.

Material to be covered: The Chapters are from the text above. The topics will be essentially same if the textbook changes. Some of this material was covered in MATH 1560, in the two-dimensional case. The students are strongly recommended to review MATH 1560.

Chapter 11 Vectors, Curves, and Surfaces in Space: Vectors in the Plane, Three-Dimensional Vectors, The Cross Product of Two Vectors, Lines and Planes in Space, Curves and Motion in Space, Curvature and Acceleration, Cylinders and Quadric Surfaces, Cylindrical and Spherical Coordinates

Chapter 12 Partial Differentiation: Functions of Several Variables, Limits and Continuity, Partial Derivatives, Multi-variable Optimization Problems, Increments and Linear Approximation, The Multi-variable Chain Rule, Directional Derivatives and the Gradient Vector, Lagrange Multipliers and Constrained Optimization

Chapter 13 Multiple Integrals: Double Integrals, Double Integrals over More General Regions, Area and Volume by Double Integration, Double Integrals in Polar Coordinates, Applications of Double Integrals, Triple Integrals, Integration in Cylindrical and Spherical Coordinates, Surface Area, Change of Variables in Multiple Integrals

<u>Chapter 14 Vector Calculus</u>: Vector Fields, Line Integrals, The Fundamental Theorem and Independence of Path, Green's Theorem, Surface Integrals, The Divergence Theorem, Stokes' Theorem

<u>PDE Chapter 10 of Boyce and DiPrima</u>: Fourier Series, Heat, Wave, and Laplace Equations

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Grading:

For each course, the instructor chooses a grading strategy appropriate to departmental and college guidelines, and the related discipline. Some of the recommended options include (but not limited to) the following:

With **criterion-reference grading**, students receive grades based on the quality of their work in relation to the criteria defined by the instructor and by the rubrics or models specifying the qualities of each grade. Some instructors may choose to adjust the scale (criteria) if a need arises.

Norm-based grading is used in the course which is based on how others in the class perform. This method is generally used in large lecture courses or coordinated multi-section courses. The distribution of grades may be based on CLAS recommendations.

Grading System: Plus/minus grading will be used.
XX%   X midterms (dates)
XX%   Final exam (date, time and place to be announced)
XX%   X Quizzes, about every other week (dates)
XX%   Homework, assigned weekly, and usually due the following week
XX%   Attendance and class participation (optional)

All exams are comprehensive, unless specified otherwise.

A Word about the Date and Time of the Final Exam: The date and time of every final examination is announced by the Registrar generally by the fifth week of the classes. **No exams of any kind are allowed during the last week of classes.** All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of the final exam.

Make-up policy:

As stated in CLAS webpage: https://clas.uiowa.edu/faculty/student-attendance-and-absences:

"University policy requires that students be permitted to make up examinations missed because of illness, mandatory religious obligations, authorized UI activities, or unavoidable circumstances. An unavoidable circumstance is defined as an event beyond the student's

control and often involves a serious and unexpected hospitalization, a family tragedy, or a related incident. Such circumstances **do not include** attendance at a wedding, a family vacation, obligations related to work or other such matters. The instructor of a student participating in an authorized UI activity is sent a statement generally by email from the UI official in charge of the event before the absence occurs; this statement will include the specific date and time that the student will miss class. Activities related to employment, fraternities or sororities, or volunteer activities are not UI authorized activities."

Student Collaboration: Student collaboration is NOT permitted on exams. Any attempt to collaborate during exams will result in a 0 score on that test. The instructors will specify if collaboration is allowed on assignments and, if so, the expectations for a student's individual performance.

Other Course Policies: For Fall 20xx

Students are expected to attend all lectures, and do all of the homework regularly. Students are responsible for everything covered in the lectures, textbook and the prerequisites. Important announcements about changes (if necessary) to the syllabus, homework, exams, etc. will be done in the lectures or they will be e-mailed to your UI e-mail address.

There may be quizzes, depending on the section (excluding the weeks of the exams), consisting of problems similar to those assigned as homework. Taking all quizzes and all exams (midterms and final) is mandatory. In the exams, you are expected to show all of your work in an organized and coherent fashion. In the long problems, all work must be shown, and giving only a final solution obtained by guessing or using a calculator may not earn full credit. Make-ups may be given for the exams missed due to unavoidable circumstances and compelling reasons which are documented in writing. If you have a conflict or a medical reason, discuss your situation with your lecturer as soon as possible.

You are strongly encouraged to go to your lecturer's office hours. Make an appointment, if you have a conflict with the listed office hours.

Cell phones must be turned off during the lectures and exams. If you have to read or text a message during the lecture, please do it outside the classroom. During the exams, the cell phones are required to be put (far) away, preferably at the bottom of your backpack. During the exams, you cannot hold them in your hand, not keep them on your desk, chair, or anywhere easily accessible, and you cannot use it as a calculator.

Resources for Students:
Math Tutorial Lab: 125 MLH http://www.math.uiowa.edu/math-tutorial-lab
Students will find the Writing Center and the Speaking Center very useful for this course:
Writing Center: http://www.uiowa.edu/~writingc/
Speaking Center: http://clas.uiowa.edu/rhetoric/for-students/speaking-center

<u>Notes to the Students:</u>

1. All students in the College have specific rights and responsibilities. You have the right to adjudication of any complaints you have about classroom activities or instructor actions. Information on these procedures and your responsibilities is available in the Schedule of Courses and on-line in the College's Student Academic Handbook, (https://clas.uiowa.edu/students/handbook) In summary, first see the person you wish to complain about, and then see his/her immediate supervisor. The chain is: graduate or undergraduate assistants, then Prof. XX, then the Chairman of the Department of Mathematics Prof. YY, and then an appropriate Dean. The Department of Mathematics has offices in 14 MLH (MacLean Hall). To make an appointment to talk to the chairman of the department call 335-0714 or contact the departmental secretary in 14 MLH.

2. We would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please contact your lecturer during his office hours, in the beginning of the semester and far in advance of the exams. You should notify the Office of Student Disability Services, SDS and obtain the form(s) needed. The necessary modifications will be made available to you after the SDS processes and approves your request.

3. We are planning to use ICON for posting grades and other course material. Also, some announcements may be e-mailed through ICON to your UI e-mail. Check ICON and your UI e-mail regularly, and make sure that UI has your correct e-mail address.

4. This course plan may be modified during the semester. All changes will be announced in class in advance. It is solely the student's responsibility to be informed of such announced changes.

CLAS Teaching Policies & Resources — Syllabus Insert
https://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert