MATH 320: Calculus III

Spring, 4 Credits, MWF: 12:10 pm – 1 pm, R: 12 noon – 12:50 pm, MC 418.
Instructor: Michael Wodzak, Associate Professor, Mathematics Department
Office: MC 525 Hrs: Daily 8 – 10, or by appt,
Ph: 3659
Email: mawodzak@viterbo.edu
Final Exam: Monday, 4 May 09, 3 –5 pm.

Catalog Description:
Multivariate calculus: three-dimensional coordinate system, vectors and applications, partial differentiation, multiple integration and applications.
Prerequisite: grade of C or higher in 221.

Text: *Calculus – Concepts and Contexts* (3rd edition), by James Stewart, Brooks/Cole Publishing, 2001.

General Education Core Abilities:
These skills are related to the Gen Ed core abilities document. Since MATH 320 may be taken in partial fulfillment of the General Education component of a degree, these are listed in this syllabus.

1. **Thinking Skills**:
   - Uses reasoned standards in solving problems and presenting arguments.
2. **Communication Skills**:
   - Reads with comprehension and the ability to analyze and evaluate.
   - Listens with an open mind and responds with respect.
   - Accesses information and communicates using current technology.
3. **Life Values:**
   - Analyzes, evaluates and responds to ethical issues from an informed personal value system.
4. **Cultural Skills:**
   - Understands culture as an evolving set of world views with diverse historical roots that provides a framework for guiding, expressing, and interpreting human behavior.
   - Demonstrates knowledge of the signs and symbols of another culture.
   - Participates in activity that broadens the student's customary way of thinking.
5. **Aesthetic Skills:**
   - Develops an aesthetic sensitivity

Mathematics Program Course-level Outcomes:
As part of the assessment process, I also list here the specific student outcomes desired for math majors in this course. Even though we want to use this list to help us assess the success of the mathematics program, to judge how well we are doing what we think we are doing, these outcomes are also important for those of you who are not math majors.

Content
- Students will understand the concepts three-dimensional space, vectors, multivariable functions and their derivatives, multiple integration and their applications.

Reasoning
- Students will be able to reason deductively to prove the truth or falsity of a conjecture (Outcome 2.2)

Problem Solving
- Students will apply calculus techniques to novel or non-routine problems (Outcome 3.1)
- Students will demonstrate the ability to solve a problem in multiple ways (Outcome 3.2)

Technology
- Students will use a calculator for basic computation and for graphing functions with an appropriate viewing window and scale (Outcome 4.1)
- Students will demonstrate an understanding of the limitations of a calculator (Outcome 4.2)
- Students will use *DERIVE* (CAS software) to solve problems (Outcome 4.3)

Communication
- Students will use mathematical notation and language to accurately and appropriately write solutions to problems (Outcome 5.1)

Additional comments:

From a most general perspective, the student should see growth in his/her mathematical maturity. The three-semester sequence of calculus courses form the foundation of any serious study of mathematics or other mathematically-oriented disciplines and this course is the capstone of that sequence.

Course Content Outline:

The student will study three-dimensional space and vectors, lines, planes and general surfaces.
The student will study derivatives and partial derivatives of functions in 3D space.
The student will study the concept and process of multiple integration, and explore a variety of applications of such processes.

COURSE PHILOSOPHY AND PROCEDURES:

PLEASE feel free to come see me to discuss questions or concerns you may have during the course; I will not bite! PLEASE ask questions in class if you have them; the only dumb question is the one you fail to ask!

Let me urge you to make it a regular part of your day to try working the **HOMEWORK** problems. There will never be enough time for us to go through every listed problem in class, and it is unrealistic to think that you will be able to find the time to work through every listed problem, but you should at least spend some time thinking about virtually every problem, and working the more interesting or challenging to completion. The daily Homework assignments will not generally be collected or graded. They are intended to structure your learning so that you regularly challenge yourself to see that you understand the material we are looking at. The important thing is that you at least look at all the assigned problems. You should also feel free to work other problems if you deem it necessary for your comprehension of the content.

In general, I think students can benefit greatly by **WORKING TOGETHER** on problems. While there is some danger of the "blind leading the blind" syndrome, or of students deceiving themselves into thinking they understand the material better than they actually do, for the most part grappling with ideas and trying to explain them to another student or learning to listen to others explain an idea is a wonderful way to see that you really do understand the material. In class we will spend an occasional day working on a group "lab", and we will also typically have a group "practice exam" before the individual exams, and I also encourage you to find a "learning group" outside of class.

I will be asking you to assemble a **PORTFOLIO**. The portfolio will be collected at the end of exam week. This "portfolio" should be a representative collection of your work during the semester, and should include 5 problems, written up in a finished form, along with a brief discussion of why you chose to include that particular problem. These problems should represent work you are proud of, or problems that brought you to a breakthrough point. These problems will be worth 40 points, 8 points per problem. Presumably you will hand in 5 sheets of paper, each of which will include a nicely organized solution to the problem, which might be from homework, or from a lab or worksheet, of from an exam, along with that reflection mentioned above. The portfolio will also contain all of your lab work and the labs are worth a total of 60 points.

Note that the final exam is in two halves; one half is chapter 13 material and the other half is comprehensive, covering material from chapters 8 – 12.

4 exams @ 100pts each = 400pts. Final =200 pts. Portfolio =100pts. Total = 700 pts.

I use a rather traditional **GRADING SCALE**: A = 90% (or better), AB = 87%, B = 80%, BC = 77%, C = 70%, CD = 67%, D = 60%. I do try to come up with a mix of points so that exams are not weighted too heavily; about half the points during the semester will come from individual, in-class exams - the rest will come from group labs, take-home problems, group practice exams, etc.

It is rarely much of a problem at the level of a calculus course, but it remains important that students turn in work in a timely manner, so that they do not get behind. Consequently, **LATE ASSIGNMENTS** will be penalized 20% of the possible points for each class period late, up to a maximum of three periods. Homeworks are due on the second day after we have covered the material in class.

AMERICANS WITH DISABILITY ACT:

If you are a person with a disability and require any auxiliary aids, services or other accommodations for this class, please see me or Wayne Wojciechowski in MC 320 (796-3085) within 10 days to discuss your accommodation needs.

MATH 320 Spring 2008 Course Schedule

12 Jan	[8.7] Review of Taylor and MacLaurin Series	p.621, #1 – 51 odd
14 Jan	[8.10] Using Series to Solve Differential Equations	p639, #1—10 all
15 Jan	[9.1] 3D Coordinate System	p 641, #1-13, 17-31 odd
16 Jan	[9.2] Vectors	p 649, #1-27 odd
19 Jan	[9.3] The Dot Product	p 655, #1-29 odd
21 Jan	[9.4] The Cross Product	p 664, #1-25 odd
22 Jan	[9.5] Equations of Lines and Planes	p 673, #1-25 odd
23 Jan	… more on [9-5]	p 673, #27-47 odd
26 Jan	[9.6] Functions and Surfaces	p 683, #1-25 odd
28 Jan	[9.7] Cylindrical and Spherical Coordinates	p 689, #1-25 odd
29 Jan	Lab – Families of Surfaces	
30 Jan	**Review**	
2 Feb	**Exam 1**	
4 Feb	[10.1] Vector Functions and Space Curves	p 700, #1-25 odd
5 Feb	[10.2] Derivatives and Integrals of Vector Functions	p 707, #1-21 odd
6 Feb	… more on [10.2]	p 707, #23-35 odd
9 Feb	[10.3] Arc Length and Curvature	p 714, #1-25 odd
11 Feb	[10.4] Motion in Space	p 725, #1-23 odd
12 Feb	Review of Polar Coordinates	
13 Feb	Lab – Kepler's Laws of Planetary Motion	
16 Feb	**Review**	
18 Feb	**Exam 2**	
19 Feb	[11.1] Functions of Several Variables	p 746, #1-1-29 odd
20 Feb	[11.2] Limits and Continuity	p 755, #1-27 odd
23 Feb	[11.3] Partial Derivatives	p 766, #1-25 odd
25 Feb	… more on [11.3]	p 767, #27-57 odd
26 Feb	[11.4] Tangent Planes and Linear Approximations	p 778, #1-27 odd
27 Feb	[11.5] The Chain Rule	p 786, #1-27 odd
	2 Mar – 6 Mar **Spring Break**	
9 Mar	[11.6] Directional Derivatives and the Gradient Vector	p 799, #1-31 odd
11 Mar	[11.7] Maximum and Minimum Values	p 809, #1-23 odd
12 Mar	… more on [11.7]	p 809, #25-43 odd
13 Mar	[11.8] Lagrange Multipliers	p 818, #1-19 odd
16 Mar	Lab – Quadratic Approximations	
18 Mar	**Review**	
19 Mar	**Exam 3**	
20 Mar	[12.1] Double Integrals over Rectangles	p 836, #1-11 odd
23 Mar	[12.2] Iterated Integrals	p 842, #1-21 odd
25 Mar	[12.3] Double Integrals over General Regions	p 850, #1-27 odd
26 Mar	[12.4] Double Integrals in Polar Coordinates	p 856, #1-25 odd
27 Mar	[12.5] Applications of Double Integrals	p 866, #1-21 odd
30 Mar	[12.6] Surface Area	p 870, #1-17 odd

1 Apr	[12.7] Triple Integrals	p 879, #1-19 odd
2 Apr	[12.8] Triple Integrals in Cylindrical and Spherical Coords.	p 887, #1-25 odd
3 Apr	[12.9] Change of Variables in Multiple Integrals	p 897, #1-11 odd
6 Apr	Lab – Roller Derby	
8 Apr	**Review**	
	9 Apr – 13 Mar **Easter Holiday**	
15 Apr	**Exam 4**	
16 Apr	[13.1] Vector Fields	p 910, #1-17 odd
17 Apr	[13.2] Line Integrals	p 921, #1-15 odd
20 Apr	[13.3] The Fundamental Theorem for Line Integrals	p 931, #1-17 odd
22 Apr	[13.4] Green's Theorem	p 939, #1-19 odd
23 Apr	[13.5] Curl and Divergence	p 946, #1-33 every other odd
24 Apr	[13.6] Surface Integrals	p 958, #1-35 every other odd
27 Apr	[13.7] Stoke's Theorem	p 964, #1-17 odd
29 Apr	[13.8] The Divergence Theorem	p983, #1-27 odd
30 Apr	**Review**	
1 May	**Review**	

Final Exam: Monday, 4 May 2009, 3 – 5 pm