MATH 2321 **Fall 2009**

Calculus 3 for Science and Engineering (Honors)

Course Syllabus

This course extends the techniques of calculus to functions of several variables, and introduces the calculus of vector fields in two and three dimensions. Topics include lines and planes, 3D graphing, partial derivatives, the gradient, tangent planes and local linearization, optimization, multiple integrals, line and surface integrals, the divergence theorem, and theorems of Green and Stokes with applications to science and engineering and several computer lab projects.

INSTRUCTOR: Robert McOwen, 445 LA, ext. 5678, mcowen@neu.edu

OFFICE HOURS: Tuesdays & Thursdays 4:30-5:30 pm, Wednesdays 2:00-3:00 pm, or by appt.

TEXT: James Stewart, *Calculus: Concepts & Contexts, Volume II*, Cengage, 2009.

SUPPLEMENTS: Additional notes, computer labs, and information about honors exercises will be made available during the semester.

HOMEWORK ASSIGNMENTS: There is a list of exercises below; these represent the basic material in the course. Additional honors exercises and computer labs will be distributed later. I will announce in class and on Blackboard exactly which exercises & labs are due on which days.

QUIZZES & EXAMS: Weekly 10 min quizzes will be given on Thursdays, the first on September 17. Instead of a quiz, hour-long exams will be given on October 1, November 2, and December 3.

TUTORING CENTER: If you want additional individual help with class material, you can go to the Math Tutoring Center, 540B NI. Beginning Monday, September 21, the regular hours will be Mon-Wed 10am-9pm, Thurs 10am-6pm and Fri 10-1.

GRADING: The course grade will be determined as follows

- Final exam 40%
- 3 Midterm Exams 30%
- Quizzes & Homework 30%

VARIOUS POLICIES:

- **Makeups.** Without prior notice, there will be **no makeups** of quizzes or midterm exams; similarly, homework assignments (including labs) will **not** be accepted late. In both cases, you must contact me *before* the event. On the other hand, I will be dropping the lowest quiz score, so one missed quiz will not count as a zero.
- **Final Exam.** All students must take the final exam at the scheduled time (unless you have a legitimate conflict). In particular, do not make travel plans that conflict with the final exam.
- **Academic Honesty.** Cheating will not be tolerated: this includes sharing answers on quizzes or exams, or copying other students' work on written assignments. (Collaboration is encouraged, but you **must** hand in work that you have written yourself.) All incidents of cheating will be reported to the Office of Judicial Affairs, and could lead to a monetary fine, deferred suspension, and/or expulsion from the University.
- **Syllabus.** It is your responsibility to be aware of any changes the instructor may make to the syllabus as they are announced in class. Students are responsible for all information given when they are absent.
- **Problems.** If a concern about the course cannot be resolved by speaking with me, the next step is to speak with the Course Coordinator, Professor T. Gaffney, 526A NI, x3587, gaff@neu.edu.

EXERCISES (from textbook, in order of coverage)

9.3 The Dot Product (p. 653): 1a,c,d,f, 3-8, 14-16, 21a,b, 22, 29-32, 31-32, 41

9.4 The Cross Product (p. 661): 1, 2, 3, 7-9, 15-17, 21-23, 27, 28

9.5 Equations of Lines and Planes (p. 670): 1-3, 5-7, 9-12 ,15, 16, 21-25, 33, 34, 39-42

9.6 Functions and Surfaces (p. 680): 1, 5, 7, 9-11, 13, 18-20

11.1 Functions of Several Variables (p. 745): 1, 3, 9, 13-16, 19-21, 27-30, 36

11.2 Limits and continuity (p. 755): 5, 7, 9, 11, 13, 29, 30

11.3 Partial Derivatives (p. 766): 1, 3-6, 10, 11, 15-33(odd), 51, 53

11.4 Tangent Planes and Linear Approximations (p. 778): 1, 3-4, 11-13, 17, 19, 20, 23, 25, 31-33, 35, 37

11.5 Chain Rule (p. 786): 1-11(odd), 13-15, 22, 23, 33, 34, 36-39

11.6 Directional Derivatives (p. 799): 1-5, 7-10, 11-14, 21-23, 25, 27, 29-32, 34, 36, 39-41, 47, 50-52

11.7 Maximum and Minimum Values (p. 809): 1, 3-7, 9, 10,18, 19, 27, 28

11.8 Lagrange multipliers (p. 818): 1, 3, 7, 11, 25, 27, 29, 33, 34, 36, 38. Use Lagrange multipliers for the next group of problems too: p. 810 #48, p. 826 #64-65

12.1 Double integrals over rectangles (p. 837): 3, 5, 9

12.2 Second Derivatives Test,Iterated integrals (p. 843): 3-11(odd), 23-26, 30, 31, 35

12.3 Double integrals (p. 850): 1, 3, 5, 9, 10, 15, 16, 23, 25, 27, 29, 41, 42

12.4 Double integrals in polar coordinates (p. 858): 1-7, 9, 15-18, 24

12.5 Applications of double integrals (p. 866): 1-9(odd),13,14,16,17,19,21,27

12.7 Triple integrals (p. 873): 3, 5, 7, 11-13,19-21, 37, 39, 51

9.7 Cylindrical and spherical coordinates (p. 686): 3, 5, 7, 9, 11-14, 21, 22, 31

12.8 Integrals in cylindrical and spherical coordinates (p. 887): 1-8, 11-13, 15, 17,19, 22, 23, 25a

13.1 Vector fields (p. 911): 1, 3, 5-6, 11-18, 21, 23, 25

13.2 Line Integrals (p. 922): 14-20, 32a, 40-43

13.3 Fundamental Theorem of Line Integrals (p. 932): 1, 2, 3, 5, 7, 9, 11, 13, 15, 17, 19, 25, 29, 36. Also do p. 924 #39,41-43 using the fundamental theorem.

13.4 Greens theorem (p. 939): 3, 5, 7, 11, 13, 17, 18, 21-23

10.5 Parametric surfaces (p. 731): 13-18, 19-24

11.4 Tangent planes to parametric surfaces (p. 778): 39-43

13.6 Surface integrals, (p. 959): 21, 23, 25, 27, 31, 41

13.5 (Curl and) Divergence (p. 947): 1a, 3a, 5a, 9a, 10a, 22

13.8 The Divergence Theorem (p. 971): 1,5,7,9, 10-13, 19. Using the Divergence theorem, redo problems #31, 41 on p. 960 and do problems #42-47 on p. 960

13.5 Curl (and divergence) (p. 947): 1b, 3b, 5b, 9b, 10b, 13, 19, 21

13.7 Stokes Theorem (p. 947): 1, 3, 5, 7, 15, 16, 19