

**MTH 2321 Syllabus**  
**Calc 3 for Sci/Eng**  
**Fall 2009**

**Text:** *Multivariable Calculus, Concepts and Contexts, 4* by J. Stewart, Brooks/Cole. You will need the 4th edition and not the 3rd; several problems have changed.

**Instructor:** Gabe Cunningham, 538 Nightingale Hall, [cunningham.g@neu.edu](mailto:cunningham.g@neu.edu), x 5665

**Location/Time:** RB 109, MWTh 8-9:05

**Office hours:** M, Th 10:20 -11:20, W 12:40-1:40 or by appointment.

**Grading:** There will be weekly quizzes, three hour tests, a final exam, homework and computer labs. The final counts 40%, the three tests 30%, the quizzes, homework and computer labs count 30%. Late assignments will not be accepted once the grading for the assignment has begun.

All information contained in this syllabus is provisional and subject to change. All changes will be announced in class. It is your responsibility to obtain the relevant information.

**Scope of the course:** Calculus 3 will extend what you have learned in Calculus 1 and 2 to functions of several variables. In particular, you will be introduced to differentiable functions of several variables and to multiple integrals. The course will culminate with a study of multidimensional generalizations of the Fundamental Theorem of Calculus. As primary applications, we mention electrostatics and heat and mass transfer.

**Supplementary reading:** The material on vector calculus is the hardest part of the course; another treatment of this material can be found in *Div, grad, curl and all that*<sup>®</sup>, 4th edition, by H.M. Schey, ISBN 0-393-92516-1. It is a short, easy to read book, and, like other generations of engineers and scientists, you will probably find there everything you need to know about vector calculus for your future profession.

**Problem Session:** There are problem sessions / recitations that can be very helpful if you're having difficulty with a section, or just to get more practice. You are free to attend any of them. The times are as follows:

M 2:50-4:30, Ms. Yaping Yang in 105 SH

M 2:50-4:30, Mr. Liang Tian in 109 RB

W 2:50-4:30, Mr. Gufang Zhao in 105 SH

W 2:50-4:30, Mr. Liang Tian in 200 RI

**Tutoring Help:** Every year some students find the transition to 2 and 3 dimensions very difficult. Tutoring help is available in the Math. Department. Tutoring will be in 540 B Nightingale. The hours will be Mon-Wed 10am-9pm, Thurs 10-6 and Friday 10-1. This is walk-in tutoring; no appointment is necessary. The full schedule starts Monday Sept. 21.

**Communication:** I prefer using e-mail (cunningham.g@neu.edu) to stay in touch as opposed to phones, and I post the syllabus, past quizzes, tests, labs, announcements and other useful material on our Black Board web site. You can enter Black Board at <http://blackboard.neu.edu/>.

**Miscellaneous:** If there is an issue you would like to discuss, I'm always happy to meet with you about it. If you have a concern about the course or the instructor that is not or cannot be resolved by speaking with me, you can speak with the Course Coordinator, Professor Gaffney (gaff@neu.edu)

**Final Exam:** The time and date of the final exam are TBA. All students without legitimate conflicts will take the final exam at the scheduled time. Do not make travel plans that conflict with the final exam.

### **Week 1, September 9-11**

9.3 (Review only) The dot product, #1a,c,d,f, 3-8, 14-16, 21a,b,22, 31-32,41.

9.4 The cross product, #1-3,7-9,15-17, 21-23, 27,28.

9.5 Equations of lines and planes (pp. 666-670), #1-3,5-7,9-12 ,15-16, 21-25, 33-34, 39-42.

Slopes of planes problems 1-4.

### **Week 2 September 14-18**

9.6 Functions and surfaces, # 1,5,7,9-11,13, 18-20.

11.1 Functions of several variables, #1,3,9,13-16,19-21, 27-30, 36.

11.2 Limits and continuity, #5,7,9,11,13, 29-30.

11.3 Partial derivatives, #1,3-6,10-11, 15-33(odd), 51, 53.

### **Week 3 September 21-25**

11.4 Tangent planes and linear approximations, #1,3-4,11-13,17, 19-20, 23,25,31-33,35, 37 Assign Lab 1 due Monday 9/28.

Brief review of curves in space.

11.5 Chain Rule, #1-11 odd, 13-15, 22,23, 33-34,36-39.

11.6 Directional derivatives, #1-5,7-10,11-14,21-23,25, 27,29-32, 34, 36 39-41, 47 50-52. Assign Lab 2 due Monday 10/5.

### **Week 4 September 28-Oct 2**

11.7 Maximum and minimum, #1, 3-7, 9-10,18-19, 27-28.

Test 1 Thursday October 1.

### **Week 5 October 5 - 9**

11.8 Lagrange multipliers, # 1,3,7,11,25, 27, 29, 33-34, 36, 38. Use Lagrange multipliers for the next group of problems too. p810 #48, p.826 #64-65.

12.1 Double integrals over rectangles, #3,5,9.

12.2 Iterated integrals, #3-11(odd), 23-26, 30-31, 35.

**Monday October 12** Columbus Day, no classes.

**Week 6 October 12 -16**

12.3 Double integrals, #1,3,5,9-10,15-16, 23,25, 27, 29, 41,42.

**Week 7 October 19 -23**

12.4 Double integrals in polar coordinates, #1-7, 9, 15-18, 24.

12.5 Applications of double integrals (no prob-ty) #1,3,7,11,12, 15.

12.7 Triple integrals, #3,5,7,11-13,19-21,37,39,51.

**Week 8 October 26 -30**

9.7 Cylindrical and spherical coordinates, #3,5,7,9, 11-14,21,22,31.

12.8 Integrals in cylindrical and spherical coordinates, #1-8,11-13,15, 17,19,22,23,25a.

**Week 9 November 2 - 6**

Test 2 Monday November 2.

13.1 Vector fields, #1,3,5-6,11-18,21,23,25.

13.2 Line Integrals, #14-20, 32a, 40-43.

**Wednesday November 11**, Veteran's Day observed, no classes.

**Week 10 November 9 - 13**

13.3 The Fund. Theorem of line integrals #1,2,3,5,7,9,11,13,15,17,19, 25, 29, 36.  
Also do p924 #39,41-43 using the fundamental theorem. Assign Lab 3 part 1 due Monday 11/16.

13.4 Green's theorem, #3,5, 7,11,13,17,18, 21-23.

**Week 11 November 16-20**

10.5 Parametric surfaces #13-18, 19-24.

11.4 Tangent planes to parametric surfaces p779 #39-43.

13.6 Surface integrals, #21, 23, 25, 27, 31, 41. Assign Lab 3 part 2 due Monday 11/30.

13.5 Curl and divergence, (Divergence) #1a, 3a, 5a, 9a, 10a, 22.

**Week 12 November 23 -24**

13.8 The Divergence Theorem #1,5,7,9 (the next four problems review triple integrals) 10-13, 19. Using the Divergence theorem, redo problems 31, 41 on p960 and do problems 42-47 on p960.

**Wednesday Nov 25** First day of Thanksgiving recess, no classes.

**Week 13 November 30 - December 4**

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

13.7 Stokes' Theorem, #1,3,5,7,15,16, 19.

Test 3 Thursday December 3.

**Week 14 December 7- 9**

Review.

**Wednesday, December 9, last day of classes.**

**Final Exam TBA**