MTH U341 Syllabus
Fall 2004

Text: *Calculus* by Johnston and Mathews, Addison Wesley
Instructor: Alex Martsinkovsky, 471 Lake Hall, x5510, alexmart@neu.edu
Office hours: M, W, Th 11:40 – 1:10
Grading: Homework 10%, Maple Labs 10%, Quizzes 40%, Final 40%

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. To treat these topics in a systematic way, we will need rudiments of linear algebra and analytic geometry (see Chapters 8 and 9). The course will culminate with a study of multidimensional generalizations of the Fundamental Theorem of Calculus (Ch. 12). This should give you a solid background for studying vector fields. As a primary application we mention electrostatics, but the formalism you will have learned will apply to other fields as well. The text presents the material in a language that was introduced in the middle of the 18th century and is still widely used by engineers and scientists.

Maple Labs: You will be required to do a number of computerized lab assignments using the Maple software. Older versions of this software are available campus-wide in all computer labs, both on the Mac and Windows platforms. I do not recommend using version 9. If you are interested in buying the latest version, 9.5, for yourself, you can do so at a 40% student discount (download only). Here is the necessary information:

Secure ordering address: http://webstore.maplesoft.com
Promotion Code: AD1244
Course Name: Martsinkovsky MTH341

Supplementary reading: I strongly recommend the classical book *Div, grad, curl and all that*", 3rd edition, by H.M. Schey, published by W.W. Norton and Company, ISBN 0-393-96997-5. It is a short, very 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.

If you are interested in a modern approach to vector calculus (and, in particular, to the study of Maxwell's equations), I recommend *A course in mathematics for students of physics* by Bamberg and Sternberg. The new approach is "generally accepted" in the mathematics community and is being "gradually accepted" in the physics community.

Miscellaneous: If there is an issue you would like to discuss, it is a good idea to start with your instructor. If this does not help, please see the course coordinator Professor A. Martsinkovsky (471 Lake Hall, x. 5510, alexmart@neu.edu). If the issue is still not resolved, you should discuss it with Professor S. Jekel.

TOPICS AND ASSIGNMENTS

(you are strongly encouraged to work in small groups on the problem sets below)

Week 1, 9/8-10	9.2 Real-world functions, #1-7 (all), 9,11,21,22 9.3 Graphing: surfaces and level curves, #1,3,5,7,10,16,21,24,32-37
Week 2, 9/13-17	8.4 Linear functions, #1-9 (odd), 13,19,27,28 8.5 Geometry of linear functions, #1,2,5,6,9,10,14,15,17,21,22,25,29,34
Week 3, 9/20-24	8.6 Planes, #1-11 (odd),18,23,29 8.7 Motion in three dimensions, #1,3,5,11,13-16,49,57,58
Week 4, 9/27-10/1	9.5 Cylindrical and spherical coordinates, #1-13 (odd),14,16 9.6 Limits, #1-3,5-7,11.
Week 5, 10/4-8	9.7 Derivatives, #1,3,5,7,13,15,21,25,27,47,50,54,55,59,61 10.1 Differentiability, #1-11(odd),17-27(odd),28,35 10.2 Chain Rule, #1,3,5,7,11,29
Week 6, 10/11-15	10.3 Applications of Chain Rule, #1-9(odd), 15,17,19,23 10.5 Optimization, #1,3,5,9,13,23,24
Week 7, 10/18-22	10.6 Second Derivatives Test, #3,5,7,11.23,24 10.7 Optimization with constraints, #1,3,5,7,11,19,23
Week 8, 10/25-29	11.1 Double integral on rectangles, #1,7,9,11. 11.2 Extending the double integral, #1-9(odd),17,19,21,27. 11.3 Surface area, #1,3,5,9,13.
Week 9, 11/1-5	11.4 Change of variables (2-D), #1,3,7,11,13,15,19-21 11.5 Triple integrals, #5,9,17,19,27 11.6 Change of variables (3-D), #1,3,5,9.
Week 10, 11/8-12	12.1 The line integral, #1,3,6,11,12,19 12.2 Vector fields, work, and flows, #1,5,9,13,21,23,25-27
Week 11, 11/15-19	12.3 The Fundamental Thm of Line Integrals, #1-9 (odd),13,17,21. 12.4 Green's Theorem, #1-15 (odd).
Week 12, 11/22-24	12.5 Divergence and curl, #1-19 (odd). 12.6 Surface integrals, #1,3,5,7,9,11,13,17,22
Week 13, 11/29-12/3	12.7 The Divergence Theorem, #1,3,9,11,17,24,25, p.1129: 27,28 12.8 Stokes' Theorem, #1,2,3,9, p.1130: 29
Week 14, 12/6-8	Review.