MATH 213 Anal. Geometry and Calculus III SYLLABUS

Prof. Sachs Fall 2008

TEXT: Thomas' Calculus (ET, eleventh ed.) by Weir, Haas and Giordano (Addison-Wesley, 2006).

COURSE OVERVIEW: The main goals of this course are to introduce the ideas and techniques of multivariable calculus and to explore the applications or uses of these ideas and techniques. This takes several stages: vector-valued functions of one variable; then functions of several variables, and also differentiation, then integration. Throughout we will emphasize conceptual understanding using the idea of linear approximation, which leads to a better view of how these ideas and techniques were developed.

WARNING: We will be experimenting with some alternate sequencing of topics. Given the textbook order of topics, this will be uncomfortable in a few spots.

MEETING: Monday, Wednesday 4:00-5:15pm, Sci. & Tech. I, rm 129.

OFFICE HOURS: Mon. and Wed., 12:30-1:15pm and 3:00-3:45pm, Sci. & Tech I, rm 201D, and by appt.

CONTACT INFO: OFFICE PHONE: 993-1464 E-MAIL: rsachs@gmu.edu

COURSE WEB PAGE: math.gmu.edu/~rsachs/math213

GRADING: Grading will be fair and impartial. Points used as the basis of the grade will be: Hmwk. (100 pts.); Maple/Applet hmwks (50 pts.); Exams (300 pts.); Final exam (150 pts.).

POLICIES: The GMU Honor code is in effect at all times and students are expected to be fully aware of its requirements. Group work may be part of the course, in which case group members will truthfully report on non-contributing members. Absence from quizzes and exams must be for a valid reason and requires prior notification except in extreme circumstances. DO NOT ARRANGE TO LEAVE BEFORE THE FINAL EXAM.

IMPORTANT DATES: Last day to add/ drop, no tuition liability Sept. 9
Last day to drop without dean's signature Sept. 26, 5pm

EXAMS: Exam 1 **Tentative** Wednesday, Sept. 17
Exam 2 **Tentative** Wednesday, Oct. 22
Exam 3 **Tentative** Wednesday, Nov. 19
Final Exam **Definitely** Wednesday, Dec. 10, 4:30pm-7:15pm

(over)

MATERIAL COVERED AND TENTATIVE DAILY SCHEDULE

8/25; 8/27 Overview of course; quick review of calculus; 2-D and 3-D coordinates; vectors (dot product, cross product); matrices

9/3 Equations of lines, planes; vector functions of one variable; functions of several variables (intro).

9/8, 9/10 Curves in space; Curvature and torsion; planetary motion;

9/15, 9/17 Functions of two and three variables: graphs, level sets, limits, continuity; Exam 1.

9/22, 9/24 Linear approximation, gradient vector, chain rule; vector fields for drawing gradient field.

9/29, 10/1 Solving for gradient – curl and divergence introduced; Max-min problems; constraints and Lagrange multiplier rule.

10/6, 10/8 Integral in 2-D: rectangles, general domains, polar coordinates.

10/14, 10/15 Integral in 3-D: boxes, general domains, cylindrical and spherical coordinates.

10/20, 10/22 Substitution in integration; Exam 2.

10/27, 10/29 Applications of integration: surface area, average values, center of mass, moments.

11/3, 11/5 Integration over lower dimensional objects: line integral, surface integral

11/10, 11/12 Independence of path in line integrals and Fundamental Theorem for line integrals; Green's theorem.

11/17, 11/19 Green's theorem continued. Divergence form for flux. Exam 3.

11/24 Reviewing flux and circulation; additive properties.

12/1, 12/3 Extending Green's theorem into 3-D: Stokes' theorem and Gauss' theorem. Review and summary.

Along the way, we will talk about some themes: dimensionality, parametrization, approximation, and use computer software (Maple) and on-line applets to aid in visualization and calculation.