Theory of Differential Equations Math 216 – Syllabus – Spring 2012 – Prof. Sachs

TEXT: Differential Equations and Their Applications, 4th Ed. by M. Braun (Springer).

COURSE OVERVIEW: The main goals of this course are to introduce the basic ideas and techniques of differential equations. Single ordinary differential equations of first-order will be the starting point of the course, which will then extend those ideas to higher order equations and systems of equations. Links to various applications and also structural issues will be considered. Some visualization of systems will use computer software and we will use java applets (pplane and dfield by J. Polking). Linear algebra concepts will be used, including eigenvalues and eigenvectors. We will look at Fourier series as a tool for solving boundary value problems and simple partial differential equations (time permitting).

GRADING: Grading will be fair and impartial. Points used as the basis of the grade will be:

Hmwk. (300 pts.); Class (100 pts.); projects (50 pts.); Exams (400 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 their requirements. Graded 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.

MATERIAL COVERED AND TENTATIVE PACE

First Order Differential Equations – Chapter 1 (most); 3 weeks

Second-order linear differential equations – Chapter 2 (most); 3 weeks

Systems of differential equations – Chapter 3 (most); 2 weeks

Qualitative theory of differential equations – Chapter 4 (most); 2 weeks

Separation of variables and Fourier series – Chapter 5 (most); 2 weeks

Sturm-Liouville boundary value problems – Chapter 6 (most); 2 weeks

Intro to calculus of variations; projects; more PDEs 1 week