MA 2733 **Calculus III** Effective Summer 2008

Calculus, 6th Edition by James R. Stewart

In the syllabus below, 1 hour equals 50 minutes. We recommend three in-class exams in a MWF class meeting 42 hours during the semester. The use of the computer algebra system *Mathematica* is now a required component of both Calculus III and IV. Some instructors use *Mathematica* assignments based on problems in the text; others assign more substantial (group) projects. Along with other homework, these can comprise as much as a fourth test score. The department staffs Allen 411 with GTAs whose responsibility is to assist students with lab assignments. Please pass your assignments along to them so that they can be prepared.

The syllabus below represents a bare minimum. There is adequate time remaining to cover other topics at the instructor's discretion. Such topics may include in particular arclength and area in polar coordinates, section 11.4, and the integral test and comparison test for infinite series, sections 12.3 and 12.4.

Chapter

Introduction to *Mathematica* . . . . . 2 hours
Basic syntax and built-in functions; defining functions; plotting functions; differentiation and integration. A tutorial, *Getting started with Mathematica* has been prepared for instructional use and later reference. It may be downloaded from the Common drive: `\Math\Departmental Documents\Course Outlines\Calculus\Cal III` where there are also sample assignments based on the tutorial. Add your own!

11. Parametric Equations and Polar Coordinates Sections 11.1–11.3 . . . . . 5 hours
The use of command `ParametricPlot`, `Show` and the `Graphics` environment are introduced in *Getting started with Mathematica*. Projects on polar curves and others parameterized curves are provided in the sample assignments. The Laboratory Project following section 11.1 of the text concerns hypocycloids and epicycloids.
Arclength and surface area may be omitted from section 11.2 since these topics appear later in sections 14.4 and 17.6.

13. Vectors and the Geometry of Space Sections 13.1–13.5 . . . . . 5 hours
Mathematica commands for vector operations are introduced in *Getting started with Mathematica*.

14. Vector Functions Sections 14.1–14.4 . . . . . 10 hours
Motion in space, in particular, the significance of normal and tangential acceleration should be emphasized along with the analysis of curves in space. Animation is a very effective tool for illustrating motion in space. Parameterized curves can be plotted using `ParametricPlot3D`; velocity and acceleration vectors can be visualized using `Show` and the `Graphics3D` environment as in *Getting started with Mathematica*.

12. Infinite Sequences and Series Sections 12.1, 12.2, 12.5, 12.6 and 12.8–12.11. . . . . 11 hours
The emphasis in Chapter 12 should be on geometric series, power series and applications of Taylor series necessary for subsequent courses.
12.2. Telescoping series; geometric series; the harmonic series and the algebra of infinite series.
12.5. Alternating series with error estimate.
12.6. Absolute convergence; ratio and root tests (compare with geometric series).
12.8 and 12.9. Power series; radius of convergence and open intervals of convergence (Do not worry about endpoints.) Differentiation and integration; power series representations;
12.10 and 12.11. MacLauren and Taylor series. `Animate` or `Manipulate` can be used to illustrate convergence of Taylor polynomials; see *Getting started with Mathematica*.

Total: 33 hours