Calculus

CRN: 40025
M - Th, 9 a to 1 p
SemII C 3109
Calculus 3rd ed, Strauss Bradley SMITH

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Office hrs: before and after class

1. Content

Arguably, no scientific theory or work has had more influence on Western European science than calculus. This course will introduce students to the techniques and ideas of differential and integral calculus, but will also provide broader context for the development and effects of calculus-based science. Equal emphasis will be placed on the derivative and the integral, but it may seem that we hardly get to know the integral. Infinite series will be briefly introduced. Class will be organized around group work and presentations.

The two main ideas introduced and developed in the class are the derivative of a function and the integral, definite and not so definite, of a function. Motivation and meaning of the derivative will be stressed. The derivative will be introduced via an optimization problem. Rules for differentiating are important but not primary. Using the derivative will be the emphasis in the first part of the class. The mean value, intermediate, and Rolles theorems and their consequences will be major topics. Partial differentiation will be introduced as an extension/generalization of differentiation wrt to one variable.

Integration will be introduced via the definite integral which, in turn, will be introduced via a moment-arm problem. Numerical and graphical techniques will be considered as well as symbolic methods. We will not have enough time to cover all or even most of the rules and tricks and fancy stuff around integration. We will emphasize the basic methods, the core ideas, and uses of the definite integral.

Infinite series will not be emphasized nor will convergence tests be introduced, but convergence in general, and convergence of geometric series in particular, will be considered. Some consequences of convergence and applications to improper integrals will be the main topics. Throughout, numerical, i.e. approximate solutions will be considered. So will proofs and theorems. And heuristically justifiable hand waving. Without a graphing calculator or its equivalent you will have one less tool with which to solve worthwhile problems.

2. Evaluation

- **Homework** from the text will be assigned and collected regularly. Problems will not necessarily be evaluated individually. Homework is your rehearsal time and a great way for you to formulate questions for class.
- **In-class presentations**will be a major part of the class. You will work in groups of one, two or three on problems and present your results to the class.
- There will be a **TCAT** given at the end of each week in class. A TCAT is not a test, or it would be called a "test". I don't know what a TCAT is nor what it stands for but we have one each week. At the end of weeks three and five the TCAT will be in two parts and a little more substantial than the other TCATs.
- There will be **workshops** throughout the session. All will be group efforts.

3. Credit

In order to receive full credit you must:

- attend class - more than one absence may result in loss of credit;
- complete all homework;
- participate in all class presentations;
- write all TCATs;
- complete all workshops;
- collect all work and handouts in a portfolio;
- demonstrate acceptable understanding of the material covered; and
- write a self- and faculty evaluation - *formal* evals are not required.

4. Tentative Calendar

Week 1

Date	Topics	Read and work on after class
July 25	Pre-assess; infinity Historical setting	Essay p.46 **2.1** 1 - 7, 9, 22, 30, 46 **2.2** 6, 11, 17, 27, 33, 34, 44, 55, 60
July 26	Limits Rates of change	**2.3** 1 - 4, 6, 8, 9, 28, 32, 35, 49 **2.4** 5, 7, 11, 18, 20, 21, 51 - 54, 56, 63
July 27	Continuity and IVT Exp. and log. fcns	**3.1** 5, 13, 14, 30, 43, 52 **3.2** 5 - 8, 10, 23, 25, 27, 33
July 28	"George Hamilton and David Hasselhoff" Derivatives TCAT 1	**3.3** 1, 3, 5, 11, 15, 19, 33, 34, 47 **3.4** 3, 7, 9, 25, 41, 48