1. Your Lecturers

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2. Tutorials

Wed. 16-18.
BAB024 BA2165 BA2175 BA3116 BA3012 BA3008 BA3004 BA2159 BA2139 BA2130 BA2155 BA2145

3. Evaluation

There will be two Term Tests, one on 15 October, one on 12 November. There will also be a Numerical Assignment, due date 5 November; details to follow. The first tutorial will occur on Wednesday 10 September, when there will be no Quiz or Test. Starting 17 September, unless there is a Test, there will be a Quiz, see below re material to be covered. There will be 10 Quizzes in total, of which the 7 highest marks will be counted. Thus 3 Quizzes can be skipped entirely, which is to cover conflicts with religious holidays, etc.
On all Quizzes, Term Tests and Final Exams, no calculator or electronic device of any kind is permitted.

Marking scheme:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Term Test #1</td>
<td>15%</td>
</tr>
<tr>
<td>Term Test #2</td>
<td>15%</td>
</tr>
<tr>
<td>Tutorial Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Numerical Assignment</td>
<td>5%</td>
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<tr>
<td>Final Examination</td>
<td>50%</td>
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4. Text Material


In the UofT Bookstore, this text comes bundled with "Trigonometry for Calculus", Chapter 7, an excerpt from Stewart’s pre-calculus Text ISBN 017612271.

A solution manual for the text is available.

(b) **Supplement**: E.J. Barbeau and P.C. Stangeby, *Some Foundations of Analysis for Engineering Science (MAT194F)*. This is available on the Course website.

5. Course Website

http://courses.ece.toronto.edu/mat194h1f/ where announcements, assignments, etc. will be found.

6. Material to Cover for Quizzes

Each Quiz will consist of a few questions taken directly from the Stewart Textbook and/or from the Supplement. These Textbook questions will, in fact, be taken from a subset of the questions at the end of each section in the Text. This subset of questions are indicated below in the Course Outline. The specific material to be covered in each Quiz will be posted on the course website by the start of the weekend preceding the Quiz.

It will be essential for you to know the basics of **trigonometry** for this, as well as for many of the other courses you will take. Some of you will have covered this material.
already in high school, but some of you will not have. In any event, this material will, for
the most part, not be covered directly in this course or in your other first year courses.
**You are responsible yourself for making sure that you are on top of this material.**
You should set out to do this as early as you can – ideally in the first month of the fall
term since **each of the first 3 Quizzes will include one trigonometry question, taken from Appendix D of the Stewart textbook.** You will probably find that the material contained in Appendix D of the Stewart Text, ‘Trigonometry’, pages A24-A33, is clear enough for you and adequate preparation for the Quizzes. If you feel that you need more extensive coverage of the basics of trigonometry then you will find the "Trigonometry for Calculus", Chapter 7 of Stewart’s pre-calculus Text ISBN 017612271, which is bundled with the text, useful.

The Quiz of 17 Sept will include one of the questions from Nos. 1 – 34, pg A32.
The Quiz of 24 Sept will include one of the questions from Nos. 35 – 64, pgs A32, A33.
The Quiz of 1 Oct will include one of the questions from Nos. 65 – 90, page A33.

Note that these 3 Quizzes will also include some questions from the material being
covered in the lectures.

**7. Course Outline**

In the following:
L = lecture number
T = related section of the Textbook
TP = recommended problems in the Textbook
S = related section of the Supplement
SP = recommended problems in the Supplement.

**Note:** The following specifies the material that will be covered in the lectures and the
order of coverage. It gives, however, only a rough indication of how the material will be
divided between successive lectures.

**L1** A brief introduction, including: the problem of defining the derivative in a rigorously
logical way; problem with a/0, 0/0, \(\infty\); basic idea of the limit; the use of \(\delta, \epsilon\) ideas; the
difference between \(f(c)\) and \(\lim_{x \to c} f(x)\).
T: A preview of calculus, pages 2-9; Sec. 2.1.
TP: pages 69, 70: 3, 5
S: Sec. 1.

**L2, L3, L4** The real number system, including: field and order axioms; absolute value;
function; roots; intervals; increasing/decreasing; inequalities; intervals described by
inequalities; inequalities involving \(\delta, \epsilon\); triangle inequality.
T: Secs. 1.1, 1.2, 1.3, 1.4.
L5, L6 Rigorous definition of the limit; examples using $\delta, \varepsilon$; right-hand/left-hand limits; vertical asymptotes; infinite limits.

T: Secs. 2.2, 2.4.
TP: pages 79-82: 5, 9, 13, 15, 19, 25, 38; pages 100-102: 3, 4, 6, 9, 13, 17, 19, 22, 34, 38, 42.
S: Secs. 3.1, 3.2.
SP: Ex 14, Ex 15, Ex 18, Ex 20.

L7, L8 Limit theorems/laws; continuity; Intermediate Value Theorem.

T: Secs. 2.3, 2.5.
S: Secs. 2.8, 3.3, 3.4, 4.1.
SP: Ex 22, Ex 24, Ex 25, Ex 26, Ex 27.

L9, L10 Tangents, velocities, rates of change; the derivative; the derivative as a function; differentiability implies continuity; differentiation formulas; rates of change.

T: Secs. 2.6, 3.1, 3.2, 3.3, 3.4.

L11 Trig functions; chain rule; implicit differentiation; higher derivatives; related rates.

T: Secs. 3.5 to 3.9.

L12 Applications of differentiation; Extreme Value Theorem; Fermat’s Theorem; Maximum/minimum test.

T: Sec. 4.1.
TP: pages 229-232: 3, 13, 21, 27, 41, 47, 53, 56, 64, 68.
S: Sec. 4.2.
SP: Ex 31, Ex 32.
L13, L14  Mean Value Theorem; differentials and differences; linear approximation; derivatives and shape of graphs; increasing/decreasing test; first derivative test; concavity; point of inflection; concavity test; second derivative test; limits at infinity; horizontal asymptotes.
T: Secs. 3.10, 4.2 to 4.4.
S: Sec. 4.3.
SP: Ex 35, Ex 36, Ex 37.

L15  Curve sketching.
T: Secs. 4.5, 4.6.

L16  Optimization problems; Newton’s method; anti-derivatives.
T: Secs. 4.7, 4.9, 4.10.

L17  Review for Midterm Test.

L18, L19  Integrals; areas; the definite integral.
T: Secs. 5.1, 5.2.

L20  The Fundamental Theorem of Calculus.
T: Sec. 5.3.

L21  Indefinite integrals; substitution rule.
T: Secs. 5.4, 5.5

L22  Applications of integration; areas between two curves.
T: Sec. 6.1.
TP: pages 380-382: 5-26, 32, 44, 45.
L23  Volumes.
T: Sec. 6.2.

L24, L25  Volumes by cylindrical shells; work; average value of functions.
T: Secs. 6.3 to 6.5
TP: pages 396-397: 3, 7, 11, 21-26, 42, 44. pages 401-402: 9, 13, 19, 27, 30. page 405: 7, 9, 13, 17, 20, 21, 22.

L26  Inverse functions.
T: Sec. 7.1.

L27  The natural log function.
T: Sec. 7.2*. {Note: not Sec. 7.2.}

L28  The natural exponential function.
T: Sec. 7.3*

L29  General log and exp functions.
T: Sec. 7.4*.
TP: pages 475-476: 3-10, 13, 21, 23-38, 41-46.

L30, L31  The inverse trig functions; hyperbolic trig functions; indeterminate forms and L’Hospital’s Rule.
T: Secs. 7.5 to 7.7.

L32  Differential equations; modeling with diff eqns; separable equations.
T: Secs. 10.1, 10.3.
TP: pages 627-628: 3, 12, 14. pages 643-645: 1-14, 37, 39, 42.

L33  Exponential growth and decay.
T: Sec. 10.4.
TP: pages 656-657: 4, 8, 11, 13, 17, 21, 22.

L34 Logistic equation; linear equations.
T: Secs. 10.5, 10.6.

L35, L36 Second order linear differential eqns.
T: Sec. 18.1.
TP: page 1183: 3, 7, 11, 13, 17, 19, 21, 25, 27, 29, 32.
S: Sec. 5.

L37 Non-homogeneous liner diff eqns.
T: Sec. 18.2.
TP: pages 1190-1191: 3, 7, 9, 13, 17, 19, 21, 23, 25.

L38, L39 Review.