Mathematics 317 (3 credits) **Calculus IV (vector calculus)** Term 1 (2009/10)
Pre-requisite: Mathematics 200 (Calculus III--multivariable calculus) or equivalent.
Mathematics 221 and Mathematics 215 are ***strongly recommended***.
Textbook: Stewart, *Multivariable Calculus* (or any other suitable multivariable calculus
textbook) ***In the Course Outline, references are given to the 6th Edition of Stewart.***
Times and location: MWF 10:00am, Room: Hennings 201.
Instructor: George Bluman, Math Annex 1112, bluman@math.ubc.ca
Office Hours: by appointment. You can also try to drop-in.
Problem Assignments: due each week ***at the beginning*** of the Friday class. ***Assigned
homework problems (to be handed in) will not be from the textbook.***
Midterms: There will be three in-class midterms tentatively scheduled to be held on
October 5 (Mon) based on Weeks 1-4, October 26 (Mon) based on Weeks 5-7, and
November 20 (Friday) based on weeks 8-11.
Grading: 45% from the three Midterms + homework assignments; 55% from the Final
Exam. ***You must pass the Final Exam and also have a passing grade on the homework
problems to pass the course!*** *No notes, books or calculators will be allowed for in-class
midterms or the Final Exam.*

COURSE OUTLINE—tentative
I. Vector calculus for functions of one variable
1. Week of September 9: differentiation of vectors—velocity vector, speed, acceleration
vector, Newton's 2nd law of motion, rotational motion
Reading: 14.1-14.4
Suggested Problems: p.882: 3-14, 19-32, 40-42.
2. Week of September 14: space curves--tangent vector, arc length, parametrized curves,
principal normal, curvature, radius of curvature, radius of curvature, osculating plane,
binormal, torsion, Frenet-Serret formulas
Reading: 14.2-14.4
Suggested Problems: p.864: 3-51; p. 872: 1-6, 13-33, 36, 37, 40-49, 51-60
3. Week of September 21: Kepler's laws
Reading: 17.1
Suggested Problems: p.884: Applied project
II. Vector calculus for functions of two or more variables
4. Week of September 28: Vector fields—flow lines (field lines, lines of force,
streamlines), sources and sinks, electric fields, gradient fields, dipoles
Reading: 17.2
Suggested Problems: p.1068: 1-10, 21-28, 35, 36
5. Week of October 5: *midterm #1 on Mon, October 5th.* Line integrals
Reading: 17.3
Suggested Problems: p.1079: 1-16, 19-22, 33-45
6. Week of October 14: conservative field, potential, independence of path
Reading: 17.5 (pp.1097-1102)
Suggested Problems: p.1089: 3-10, 12-22
7. Week of October 19: divergence, curl and gradient operators
Reading: 17.6
Suggested Problems: p.1104: 1-8, 13-32

8. Week of October 26: surface area, vector identities—Laplacian
Suggested Problems: p.1115: 19-26, 37-47, 53-60; 1104: 23-32
9. Week of November 2: *midterm #2 on Mon, November 2nd.* More on conservative fields, simply connected domains
Reading: 17.7
Suggested Problems: p.1090: 26-34
10. Week of November 9: surfaces, surface integrals, fluxes
Reading: 17.9
Suggested Problems: p.1127: 4-30, 35-47
11. Week of November 16: *midterm #3 on Fri, Nov 20th.* Divergence Theorem.
Reading: 17.4
Suggested Problems: p.1139: 1-15, 17, 18, 23-32.
12. Week of November 23: Green's Theorem, Stokes' Theorem
Reading: 17.8
Suggested Problems: p.1096: 1-14, 17-29; p.1133: 1-10, 13-20

III. Catch-up? and/or review?
13. Week of November 30: may be used for lectures to catch-up on schedule—otherwise for review