

Math 3140-001:

Fall 2017

Vector Calculus and Partial Differential Equations for Engineers.

Instructor	Alexander Balk JWB 304, balk@math.utah.edu, 801-581-7512 Office Hours: TBA	
Time and Place	MTWF, 07:30-08:20am, JFB 102 Lab 3140-002: H, 07:30-08:20 am, JWB 333 Lab 3140-003: H, 08:35-09:25 am, LCB 323	
Text	(1) <i>Calculus: Concepts and Contexts</i> (4th ed) by James Stewart (ISBN-13: 978-0-495-55742-5), <i>Chapters 12 & 13</i> , while the whole textbook is for your reference. (2) <i>Applied Partial Differential Equations</i> <i>with Fourier Series and Boundary Value Problems</i> (5-th ed.) by Richard Haberman (Chapters 1-4 and 10) These five chapters are re-printed in the Custom Edition for the University of Utah: <i>Linear Algebra & Differential Equations</i> <i>with Introductory Partial Differential Equations and Fourier Series</i> (Chapters 12-16) You can choose either the Custom Edition or the PDE textbook.	
Grading Policy	The grade for the class will be based on (1) Weekly homework (HW), usually due on Wednesdays — 10% (1 lowest score will be dropped) (2) Lab (L)— 10% ; (3) Weekly Quizzes (Qz), 20 min in the beginning of class usually each Wednesday — 40% ; (1 lowest score will be dropped) (4) Two 50 min midterms (M) — 10% + 10% ; (5) Comprehensive final (F) — 20% . The total grade is on curve.	
Dates	Labor Day	Mon., Sept. 4
	Midterm 1	Wed. Oct. 4; in class
	Fall break	Sun.-Sun. Oct. 8-15
	Thanksgiving	Thu.-Sun., Nov. 23-26
	Midterm 2	Wed. Nov. 29; in class
	Last Class	Thu. Dec. 7
	Final	Fri. Dec. 15, 8:00 - 10:00 am; in the regular room (according to the university schedule)

(over, please)

Learning Outcomes

1. Double and triple integrals
2. Iterated integrals. Fubini's theorem
3. Change of variables in multiple integrals. Jacobian
4. Scalar and vector fields. Del, grad, div, curl, Laplacian
5. Line-, surface-, volume- integrals
6. Relation to physical concepts: Work, Fluid flow, Electromagnetism
7. **Theorems of Green, Stokes, and Gauss**
8. Meaning of PDEs and boundary conditions. Heat, wave, and Laplace equations
9. Derivation of PDEs from balance of the energy and other conserved quantities
10. **Method of separation of variables**
11. Superposition Principle
12. Fourier Series
13. **Fourier transform**

HW assignments will be posted on **Canvas**.

The first quiz is on the first Wednesday. The first HW is due the second Wednesday.

The **midterm/final** problems will be **similar** to the HW problems and to questions in the quizzes.

Questions in the quizzes usually will be similar to the ones considered in lectures or in homework.

You need to solve the test problems (in Quizzes, Mid Terms, and Final) **without books, notes, or electronics**.

For any problem, just the correct answer (without derivation or explanation) costs nothing. And vice versa, the incorrect answer (e.g. resulting from an arithmetical mistake at the end of your solution) might give you 100%.

The **quizzes** are designed to check your basic understanding. If you are below perfect on quizzes, you probably have missed something and need to re-learn this quickly (otherwise, you might waste some of your time during lectures, unable to follow them).

If something is unclear, please **ask** me right away. Otherwise, small misunderstanding can cause significant problems later. I would be very happy to discuss your questions. You can ask me during lectures (others might have similar problems, and in-class discussion would be helpful), after lectures (on Tuesdays), during office hours, or make an appointment.

Discussions with fellow students can also be very helpful.

Take into account that it is one thing to follow and completely understand a given solution, but it is a **very different thing** to solve the problem by yourself. It is very important that you solve HW problems (even if solution is available to you). HW makes a significant **indirect** contribution to the final grade. Besides the assigned HW problems, you might want to do similar problems, for which you have answers or even solutions.

Mathematics Tutoring Center <http://www.math.utah.edu/ugrad/mathcenter.html> . Free tutoring is available in room 155 of the T. Benny Rushing Mathematics Center (between LCB and JWB). Only some of the tutors can help with Math 3140; check the schedule on the web site (before going there).

The Americans with Disabilities Act requires that reasonable accommodations be provided for students with physical, sensory, cognitive, systemic, learning, and psychiatric disabilities.