Welcome To Math 21a
Multivariable Calculus

http://www.courses.fas.harvard.edu/~math21a/
Welcome to Math 21a

This Week’s Office Hours:

- Today: 9:00–11:00 AM, 2:00–3:00 PM
- Tomorrow: 10:30–11:30 AM
- Friday: 1:30–2:30 PM
Prerequisites for Math 21a

Prerequisites:

- Math 1b
- A satisfactory score on the Math Placement Exam

Questions? See a math adviser

You must section for this course

http://www.math.harvard.edu/sectioning/
The Geometry of Space

- Lines, planes, curves, and surfaces in three-dimensional space
- Parametric representation of curves and surfaces
Functions of Several Variables

- Differentiation
- Partial differential equations and their solutions
- Gradients, the chain rule, and directional derivatives
- Finding extrema
Integration & Integral Theorems

- Integration of functions of more than one variable
  \[ \oint_C P \, dx + Q \, dy = \iint_D \left( \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) \, dA \]

- Integrating on curves, surfaces, and solids
  \[ \oint_C \mathbf{F} \cdot d\mathbf{r} = \iint_S \text{curl} \, \mathbf{F} \cdot d\mathbf{S} \]
  \[ \iint_S \mathbf{F} \cdot d\mathbf{S} = \iiint_E \nabla \cdot \mathbf{F} \, dV \]

- Versions of the Fundamental Theorem of Calculus
Sectioning

To enroll in Math 21a, you must section by noon tomorrow!

See http://www.math.harvard.edu/sectioning/.

See a math adviser if you need help picking a course.
The Textbook

*Multivariable Calculus: Concepts & Contexts, 3e*
by James Stewart

Careful! There are many versions:

- single variable only
- multivariable only (Ch. 8–13)
- both single and multivariable (Ch. 1–13)
Mathematica

- A state-of-the-art Computer Algebra System
- May be downloaded from FAS Information Technology or used in the FAS Computer Lab: www.fas-it.fas.harvard.edu
- We will have several short projects meant to familiarize you with this valuable tool
Exam Dates

Mark Your Calendars!

- Midterm 1: Thursday March 5th, 7:00–9:00 PM
  Science Center Hall D

- Midterm 2: Tuesday April 7th, 7:00–9:00 PM
  Science Center Hall C

- Final Exam: Monday, May 18th (Time & Room TBA)

No calculators or notes are permitted during exams.
Homework

- Everyone does the same homework
- Two homework schedules: MWF versus TTh
- Homework is due at the beginning of class
- **No Late Homework**
- We drop your three lowest homework scores
## Grading

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Midterm 1</td>
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<td>Midterm 2</td>
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<td>Final Exam</td>
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<td>Homework</td>
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<td>Mathematica Labs</td>
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Use The System

- **Course Assistants (CAs)**
  
  Each Math 21a section has an undergraduate CA.
  
  CAs hold weekly 60-minute problem sessions.

- **TF Office Hours**

- **Math Question Center (MQC)**
  
  Our MQC will be in SC 309 this semester.
Important Addresses

Peter M. Garfield (Course Head)
garfield@math.harvard.edu

Course web page:
http://www.courses.fas.harvard.edu/~math21a/

Sectioning Info:
http://www.math.harvard.edu/sectioning/