Math 180

Fall 2018

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office hours:	M 4:30–6:00, F 3:30–5:00, or by appointment
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course web page:	`http://www.math.brown.edu/~bjc/courses/math180/`
resource page:	`http://www.math.brown.edu/~bjc/courses/math180/resources.pdf`

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Exam #1, 7:00–8:30 p.m., Thursday, Oct. 18, *room to be assigned.*

Exam #2, 7:00–8:30 p.m., Thursday, Nov. 15, *room to be assigned.*

Final Exam, 2:00–5:00 p.m., Saturday, Dec. 15, *room to be assigned.*

Grading:

5%	paper homework
5%	online homework
5%	quizzes
25%	exam #1
25%	exam #2
35%	final exam

Text: Edwards & Penney, *Multivariable Calculus*, sixth edition

This book is available from the Brown bookstore and Amazon.com in both new and used forms.

The main topics appear below.

- **Vectors, Curves, and Surfaces in Space.** Vectors, dot products, cross products, equations of lines and planes, curves and motion in space, curvature, acceleration, torsion.

- **Partial Differentiation.** Partial derivatives, max-min problems in several variables, the chain rule, directional derivatives, the gradient, Lagrange multipliers.

- **Multiple Integrals.** Double integrals, areas, volumes, double integrals in polar coordinates, triple integrals, integration in cylindrical and spherical coordinates.

- **Vector Calculus.** Vector fields, line integrals, independence of path, Green's theorem, surface integrals, Stokes' theorem.

- **Other Possible Topics (if time permits).** The divergence theorem.

General Discussion

Multivariable calculus, the subject matter of Math 180, is strongly recommended for anyone who wants to complete a basic understanding of calculus. As the name implies, it deals with functions of more than one variable for both integration and differentiation. This leads to volume calculations and max/min problems quite different from those seen in one variable calculus. Since most problems are phrased in terms of 2 or 3 dimensional space, there is an important geometric component to our work.

A student in Math 180 must a solid background in one variable calculus, probably from 1 or 2 years of high school classes. Those classes should have covered basic integration and differentiation, plus integration-by-parts, trig substitutions, and infinite series. If you have never seen some of those topics, then you should consider a one variable calculus course at Brown such as Math 100 or Math 170.

The good news is that most of the advanced topics of one variable calculus will not appear in this course. It is quite likely that you may never use integration-by-parts, trig substitutions, or infinite series anywhere in Math 180. So, don't feel that you have to take another one variable course just to "brush up" on your skills.

As an alternative to Math 180 you might consider Math 200 or Math 350. Math 200 is oriented toward engineering majors and Math 350 is intended for math majors. All three courses cover many of the same topics.

Over 14 weeks, students will spend about 3 hours per week in class (42 hours total). Homework and reading are estimated at around 9 hours per week (126 hours total). For each mid-term exam, 3 hours of studying are required. For the 3-hour final exam, 6 hours will be required. That makes a total of 180 hours.

Brown University is committed to full inclusion of all students. Please inform me early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information, please contact Student and Employee Accessibility Services at 401-863-9588 or SEAS@brown.edu. Students in need of short-

term academic advice or support can contact one of the deans in the Dean of the College office.

Other things to consider:

• Written homework assignments will be due on Tuesdays during a recitation (conference) run by a TA. The TA will collect the homework, discuss the solutions to homework problems, and give a short quiz. The first assignment is due and the first quiz will be given on September 11.

• Online homework is due by midnight on Mondays. Access the WeBWork assignments using `https://canvas.brown.edu/courses/`.

• If you can't get to office hours, then the next best thing is to visit MRC, the Math Resource Center. See `http://www.math.brown.edu/mrc/` for more information.

• Except for medical situations, late homework will not be accepted. Class attendance is not required, but it is strongly recommended.

• Periodically check the course web page (above) for homework assignments and other announcements.

• See the resource page (above) for a discussion of all the means available to get help with this course.

• Your homework must be written by you. If you collaborate with others, then please put their names at the top of the first page of your assignment.

• If you send e-mail, please include "(Math 180)" somewhere on the subject line. Without this, the message may be swallowed by anti-spam filters.

• If you are in Cole's section and you arrive for office hours after 5pm on Monday and can't get in the building, then call his office phone (401-863-1713). There is a security phone outside the Math Department on George Street.