Information on 18.02, Multivariable calculus, Fall 2021

Website: `https://canvas.mit.edu/courses/10306`

Prerequisite: 18.01 (single-variable calculus) or equivalent. The math department website has advice on selecting a calculus course. To get 18.01 course credit, you need to have passed 18.01 at MIT, passed the 18.01 advanced standing exam, or gotten transfer credit from another university (not high school) — getting a 5 on the AB or BC Calculus exam is *not* sufficient. If you do not have 18.01 credit, you are strongly encouraged to take 18.01 or 18.01A instead.

Required texts:

- Chapters 10–15 of Edwards & Penney, *Multivariable calculus*, 6th edition, Prentice–Hall, 2002, available from the Coop (80 Broadway, Cambridge), online bookstores, etc.
- *18.02 supplementary notes and exercises (available online)*. (Using a paper copy from a previous year should be OK too; exercise numbers have not changed in at least eight years.)

How to prepare:

- Find a study group to join at psetpartners.mit.edu. To be part of the first matching, sign up before Thurs Sept 9 at 10pm!
- Sign up on Piazza, the forum we will be using for asking and answering questions. Email the Piazza developers if you have technical problems or feedback for them.
- Review 18.01 material, as needed, especially linear approximation, max/min problems, chain rule, the two fundamental theorems of calculus, change of variable in integrals, and polar coordinates. Also review Appendix C in Edwards & Penney, if needed.
- Familiarize yourself with the MITx website where you will do part of your homework. In particular, in the Introduction section there, you can go through the seven tabs of the "Introduction to the MITx platform" and then optionally try the ungraded 18.01 review problems in "0A". There is also an MITx FAQ in the Files section of Canvas.
- On the Canvas website, please do not change your notification setting for Announcements — it should be "Notify me right away".

Instructor: Bjorn Poonen (he, him, his), 2-243, 617-258-8164, `poonen@math` (add `.mit.edu` if off-campus). It is fine to address me simply as Professor Poonen.

Recitation instructors:

- Zongchen Chen, zongchen@mit.edu
- Yuqui Fu, yuqiufu@mit.edu
- Duncan Levear, dlevear@mit.edu
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Lectures: TuTh 1–2, F 2–3 in 34-101. Attendance is recommended, though not required. I recommend that you keep electronic devices off and avoid having conversations during class, to avoid distracting other students around you. (See the research mentioned in this article!) For safety, masks covering the nose and mouth are required at all times inside the building, and no food or drink is allowed in classrooms (exception: drinking using a straw slipped under a mask, without removing/lowering the mask, is OK). Please eat lunch outside!

Recitations: On M and W, starting Wed Sept 8 (*before* the first lecture). Attend the recitation you are enrolled in. To add or change recitation, click "Section Signup" in Canvas to choose one that is not full; in case of problems, contact Theresa Cummings, 617-253-4977 in Mathematics Academic Services 2-110. There is only one lecture, so it does not matter if you are signed up for it (as long as you are enrolled in 18.02).

Office hours: Locations and times are listed here. Some are virtual, accessed via Zoom in Canvas.

Asking questions: Math is easier to explain live, so for math questions outside class it is best to come to office hours! Another possibility: Ask math questions on Piazza. Administrative questions too can be asked on Piazza, especially if other students might be able to answer them or might learn from the answer. Note: Piazza sends an email to the whole class each time you edit a post, so try to get it right the first time! If you need to contact me privately, then email me.

Assignments:

- Reading assignments are best completed *before* the topic is discussed in lecture.
- There will be 8 problem sets, due at **11:30 P.M. Eastern Time** on the following dates: Wed Sept 15, Wed Sept 22, Wed Oct 6, Wed Oct 13, Wed Oct 27, Wed Nov 3, Fri Nov 19, Fri Dec 3. Each has a Part A and a Part B.
    - Part A (short-answer problems) is to be completed online at the MITx website. These problems are automatically graded and give you immediate feedback. Some have a limit on the number of attempts. If you ever have problems with the MITx website, contact MITx Program Manager Jennifer French at jfrench@mit.edu (available M-F, 9am-5pm).
    - Part B (longer or more conceptual problems) will be posted online in Files on Canvas, and students should upload solutions to Gradescope.
- Only students who are or are expecting to be officially enrolled for credit (as an MIT student or officially cross-registering from Harvard or Wellesley) should submit Part B. If you are intending to remain a listener, you may do Part A, but do not submit anything on Gradescope; if you do Part B, *self-grade* it using the posted solutions.
- Please do not post solutions on Piazza or elsewhere before a problem is due.
- You should not expect to be able to solve every problem on your own; instead you are encouraged to discuss questions with each other and to come to office hours, so that when you submit an assignment you are pretty sure that it is complete and correct. You will learn best if you attempt as many problems as you can before meeting with your study group. **Write-ups must be done independently.** (This means that it

is OK for other people to explain their solutions to you, but you must not be looking at other people's solutions as you write your own.)

- Typesetting your solutions using LaTeX is not required (but if you want to learn it, I recommend Grätzer, *More math into LaTeX*, Springer, 2016, which you can access online for free through MIT). If you are writing solutions by hand, please scan them into PDFs.

- Write in complete sentences with correct grammar, using the textbook as a model. Solving the problem is nice, but the *real* challenge is to make your solution as clear as possible, impossible to misunderstand or misinterpret.

- Each Part B problem set ends with a fake problem called "Sources consulted". Your "solution" to this problem should consist of the words "Sources consulted: none" OR a list of all sources consulted other than the textbook, supplementary notes, and lecture notes. **This is required.** (Examples of things that should be named if consulted: a classmate, a tutor, a friend, a website, a textbook, solutions from a previous semester, etc. And remember, if you consult these, you must write your solutions afterwards while not looking at them.) For some problems, there may exist solutions of varying quality online; you are discouraged from using these; if you look at one of these, or look at solutions written by students or professors in previous semesters, you *must* mention the precise source on your assignment. Use of cheating websites such as chegg.com as a consumer or provider is forbidden.

- For each Part B problem, including the "Sources consulted" problem, indicate in Gradescope which pages of your PDF it appears on, following page 3 of these instructions.

- **Late submissions will not be accepted.** They will not be graded and will receive zero credit, unless excused (but these zeros may be boosted up to your midterm-final average as explained in the grading policy). The only exception is that for Part B, Gradescope has a grace period, allowing submission until 11:59 P.M. on the due date; this grace period is in case of technical difficulties only — the official deadline for both Part A and Part B is 11:30 P.M. Gradescope will not permit uploading of solutions at or after 11:59 P.M. Solutions may not be emailed to instructors. So plan to a submit a little early.

- Solutions will generally be posted on Canvas at 11:30 A.M. the next day. Reading them is recommended even if you solved all the problems, since there are usually many different ways to present a solution.

- Because solutions are posted, extensions will generally not be granted, even with a recommendation from S^3. But with such a recommendation you might be *excused* from completing part or all of the assignment.

- If a correct and clearly written solution of yours was not awarded credit, please first read the posted solution set for comparison, and then submit a regrade request through Gradescope and email your recitation leader that this was done. If after submitting a regrade request, you are denied credit but you still feel that your solution is 100% correct, then as a last resort you may appeal to me via email.

Exams: There will be three 50-minute midterms, on Thursday September 30 at 1pm, Tuesday October 19 at 1pm, and Friday November 12 at 2pm in 50-340 (upstairs in Walker

Memorial). In addition, there will be a 3-hour final exam on Thursday December 16, 9am-12 in Johnson Track upstairs. Notes, books, and electronic devices are not permitted during exams.

Only in limited circumstances may a make-up midterm be taken during the week after the regular midterm:

- Make-ups for *missed* midterms are permitted only with a medical excuse or prior arrangement (at least 24 hours prior).
- If you fail a regular midterm, you will be notified of an opportunity to take a make-up that can boost your midterm grade up to the minimum passing grade, which will be announced.

Grading: The weighting is: homework 4, midterms 6, final 5. Each homework grade below your midterm-final average will be boosted up to that average, except as noted in the detailed grading policy.

MIT help resources: Your friendly lecturer, your friendly recitation leader, the Math Learning Center, Mathematics Academic Services 2-110, the MIT Division of Student Life, and the Talented Scholars Resource Room. See this chart for an even longer list of help resources at MIT.

If a personal or medical issue is interfering with your studies:

- Contact your medical provider if you need medical attention.
- Please do not come to class if you are potentially contagious. *This applies even if you test negative for covid and it is just a cold, say.* Instead keep up with the assigned readings if you can, and read the lecture notes posted after each lecture. All the course content is in those. You may also attend Zoom office hours if you have questions.
- Email me and your recitation leader.
- If you are dealing with a personal or medical issue that is impacting your ability to complete work or take an exam: contact a dean in Student Support Services (S^3) at 5-104 or s3-support@mit.edu or 617-253-4861 or their virtual help-queue (weekdays 10am–12 and 2–4pm). The deans are there to help you: they will verify your situation, provide you with support, and help you work with me to determine next steps. In most circumstances, undergraduates will not be excused from coursework without verification from a dean. Typically, if excused, you will not get a deadline extension, but your missing homework scores will be replaced by your midterm-final average, and a dean's notice will permit you to take a makeup midterm during the week following the regular midterm.
- If you have some other kind of conflict, email only me and your recitation leader (not a dean) as far in advance as possible, and I will make a decision on how to proceed.
- In case of financial hardship, consider consulting the ARM Coalition.

If you need disability accommodations: Please speak with Disability and Access Services (DAS), ideally before the semester begins or early in the semester. If you have a disability but do not plan to use accommodations, it is still recommended that you meet with DAS staff to familiarize yourself with the services and resources of the office. If you have already been approved for accommodations, please email a PDF copy of the accommodation letter to

Theresa Cummings in Mathematics Academic Services 2-110 early in the semester or as soon as you receive it.

Other important things:
- It is your responsibility to email me and your recitation leader as far in advance as possible in case of an unavoidable conflict with an exam, in case of an extended absence, or in case you find yourself struggling with the course for any reason.
- If you have emergency medical information you wish to share with me, or if you need special arrangements, in case the building must be evacuated, please inform me immediately: feel free to talk to me privately after class or in my office.

Final comments: Don't work too hard! Getting exercise and the sleep you need is essential for your immune system and brain.

This is a difficult time for just about everybody, so please be patient with your fellow classmates (and with your instructors!) Also, 18.02 is not a contest, but a community of people trying to learn together, so please join study groups, join Piazza, etc., and help each other learn!