UM102: Analysis and Linear Algebra II
2019 Spring Semester

Place & Time: UG Main Lecture Hall (MLH), Mon Wed Fri 12–1 PM
TA Sessions: Mon 9:30–10:30 AM

Instructor: Apoorva Khare
Emails : `khare@iisc.ac.in`
Office : Room X-26 (top floor, X-wing), Mathematics department
Phone : (+91) 80 2293-3124
Office Hours : By appointment

Teaching Assistants (group), rooms, office hours

B	Poornendu Kumar	`poornenduk@iisc.ac.in`	Math Dept, Room L12	Mon	5–6 PM
B	Swarnalipa Datta	`swarnalipad@iisc.ac.in`	Math Dept, Room L24	Tue	5–6 PM
A	Rahul Biswas	`rahulbiswas@iisc.ac.in`	Math Dept, Room L21	Wed	5–6 PM
C	Sruthi Sekar	`sruthisekar@iisc.ac.in`	CSA Dept, Room 326	Thu	5–6 PM
D	Abhitosh Upadhyay	`abhitoshu@iisc.ac.in`	Math Dept, Room L23	Fri	5–6 PM

Course website: `http://www.math.iisc.ac.in/∼khare/teaching.html`

Course Goals (Follows closely Chapters 1, 3–5, 8–12 (and some material on ODEs) from Tom M. Apostol's book – see below.)

- Linear Algebra continued: Inner products and Orthogonality; Determinants; Eigenvalues and Eigenvectors; Diagonalisation of symmetric matrices.
- Multivariable calculus: Functions on $\mathbb{R}^n$, partial and total derivatives; Chain rule; Maxima, minima and saddles; Lagrange multipliers; Integration in $\mathbb{R}^n$, change of variables, Fubini's theorem; Gradient, Divergence and Curl; Line and Surface integrals in $\mathbb{R}^2$ and $\mathbb{R}^3$; Stokes's, Green's and Divergence theorems.
- Introduction to Ordinary Differential Equations; Linear ODEs and Canonical forms for linear transformations.

Required Text

Tom M. Apostol, *Calculus:Vol. II*, second edition.

Optional Texts

G. Strang, *Linear Algebra and its Applications*, fourth edition.

Grading & Exam Schedule (Credits 3:0)

Homework+Quiz	25%	(HW due on Wednesdays), in class
Mid-sem	25%	20 Feb, 2019 (Wed), starts at 9:30am;
		UG Building II (Old Physics Building)
Final	50%	TBA

Quizzes/Homework

There will be some weekly homework assignments and also quizzes that will count towards grades. Homework problems will be posted on the course webpage. When it is due, each student should

hand in their independently written solutions, written in their own words. Quizzes will be for 10–15 minutes, in the TA Tutorial session. The exam rules also apply to quizzes.

Miscellaneous

(1) **Exams:** There will be no backup exams, so please be on campus and available for the mid-sem and the final.

(2) **Emails:** Please write UM102 in the subject heading of all email correspondence with the instructor/TAs. This is in general effective in filtering / weeding out spam email.

(3) **Quizzes/Homework:** The TAs are responsible for the quizzes/homework component of the class. We are unable to accept late homework. Homework extensions only delay the grading of solutions.

Please submit HW on time, in the TA office hours before Wednesday's deadline, or in class. Do not place your homework under the office doors of the TA/instructors. In the past, homework placed under office doors has sometimes been lost or misplaced.

(4) **Office Hours:** Please note that it is difficult to discuss mathematics questions by email due to the lack of an appropriate interface. You are encouraged to ask your technical questions during office hours. As the TAs have responsibilities other than this course, please go to them only during office hours (unless prior arrangements have been made).

(5) **Ethics:** Read the information on the IISc student ethics page.

(6) In the past poor time management and planning have led to homework being handed in late etc... To be fair to the TAs and your fellow students, please do not unnecessarily burden the teaching team with unreasonable requests. Please be responsible and plan ahead if you have to be away from campus during the semester.