Department of Mathematics
Indian Institute of Technology, Delhi
MTL 122: Real and Complex Analysis
Course Information

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Course contents:

Real Analysis:
Metric spaces: Definition and examples. Open, closed and bounded sets. Interior, closure and boundary. Convergence and completeness. Continuity and uniform continuity. Connectedness, compactness and separability. Heine-Borel theorem. Pointwise and uniform convergence of real-valued functions. Equicontinuity, Ascoli-Arzela theorem

Complex Analysis:
Limits, continuity and differentiability of functions of a complex variable. Analytic functions, the Cauchy-Riemann equations. Definition of contour integrals, Cauchy's integral formula and derivatives of analytic functions. Morera's and Liouville's theorems. Maximum modulus principle. Taylor and Laurent series. Isolated singular points and residues. Cauchy's residue theorem and applications**.**

Reference Books

1. Metric Spaces, O'Searcoid, Mícheál
2. Elementary Analysis: The Theory of Calculus, Springer, K. A Ross
3. Victor Bryant, Metric spaces: iteration and application, Cambridge, 1985
4. Complex Analysis, Elias M. Stein and Rami Shakarchi.
5. Complex Variables and Applications, James Brown and Ruel Churchill

Information about the class:
1. Lectures: Weekly 3 hours of online lectures. Every week's lectures will be uploaded on the Impartus MTL122 page (Friday around 6-7pm). We will also upload the relevant tutorial problems and practice problems on the same page.
2. Online Tutorial sessions: As per institute schedule, we will conduct the tutorial sessions in live.
3. We will use piazza for all our class discussion. Please don't forget to join:
Enroll for the same using the link: piazza.com/iit_delhi/spring2021/mtl122
Access Code: mtl122

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Grading Policy:
There will be one minor examination of 30%, one major examination of 40%, and two quizzes (out of three quizzes best two will be considered) which carry the remaining 30% (15% each). For audit pass you need to score at least 35%.

Exam	Date	
Quiz 1	28th Feb 2021	Metric spaces: Definition and examples. Open, closed and bounded sets. Interior, closure and boundary. Convergence and completeness.
Minor 1	According to institute schedule	Metric spaces: Definition and examples. Open, closed and bounded sets. Interior, closure and boundary. Convergence and completeness. Continuity and uniform continuity. Connectedness, compactness and separability. Heine-Borel theorem.
Quiz 2	11th April 2021	Pointwise and uniform convergence of real-valued functions. Limits, continuity and differentiability of functions of a complex variable. Analytic functions, the Cauchy-Riemann equations. Definition of contour integrals, Cauchy's integral formula
Quiz 3	2nd May 2021	derivatives of analytic functions. Morera's and Liouville's theorems. Maximum modulus principle. Taylor and Laurent series. Isolated singular points and residues
Major	According to institute schedule	Complete syllabus