INDIAN INSTITUTE OF TECHNOLOGY GANDHINAGAR
DISCIPLINE OF MATHEMATICS

MA 201 MATHEMATICS III: PART I (COMPLEX ANALYSIS)
Course Plan for Semester I - 2018-2019

Instructor: Atul Dixit

Email: adixit@iitgn.ac.in

Course Associates: Shivam Dhama, Rajat Gupta, Dharmendra Kumar, and Rahul Kumar

Email: shivam.dhama@iitgn.ac.in, rajat_gupta@iitgn.ac.in, k.dharmendra@iitgn.ac.in, rahul.kumr@iitgn.ac.in

---

Topics covered

Complex Analysis: Following topics will be covered in this first part of MA 201:

- Definition and properties of analytic functions.

- Cauchy-Riemann equations, harmonic functions.

- Geometry of analytic functions: Conformal mapping.

- Power series and their properties.

- Elementary functions.

- Cauchy's theorem and its applications.

- Taylor series and Laurent expansions.

- Singularities and zeros

- Residues and the Cauchy residue formula.

- Evaluation of improper integrals.

TEXTBOOK

J. W. Brown and R. V. Churchill, *Complex Variables and Applications*, 7th edition, McGraw Hill.

REFERENCE BOOK

Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 2011.

LECTURES AND TUTORIALS

Lectures: Monday, Tuesday and Friday: 12:05 pm - 1 pm (Room 1/003)

Tutorials: Monday: 9:05 am - 10 am.

Batch	Venue	Roll Numbers	Tutor
1	7/102	$15110055, 15110059, 15110107, 17110001 - 17110035$	Atul Dixit
2	7/103	$17110036 - 17110072$	Shivam Dhama
3	7/104	$17110073 - 17110110$	Rajat Gupta
4	7/105	$17110111 - 17110148$	Dharmendra Kumar
5	7/106	$17110149 - 17110182$	Rahul Kumar

There will be one tutorial every week. Problems will be discussed from the problem sheet given to you every week based on the topics covered. You are expected to work on the tutorial problems before hand. It is important that you have a good grasp on the problems and problem solving techniques discussed during the tutorials.

My office hours: MW: 3:30 pm - 5 pm. They will be held in my office (5/ 340).

In addition to this, the course associates will also hold office hours which will be announced soon.

POLICY FOR EVALUATION

Class test (Date TBA): 15%
Mid-semester exam (Date TBA) 35%

POLICY FOR ATTENDANCE

Attendance in lectures and tutorials is compulsory. If your attendance (right from the beginning) up to an upcoming exam, either in the lectures or the tutorials, is less than 75%, your score in that exam will not be counted towards your overall grade. In case you miss lectures/tutorials for valid reasons (for example, medical), you must obtain a medical certificate from the Medical Officer of the Institute/Doctor. Make sure that you produce a xerox copy of it to the Instructor in case you fall short of the attendance.

Note: The above policies for evaluation and attendance are for the **first half** of the course only. Please keep in mind that Prof. Chelva Kumar may have his own policies.

TENTATIVE COURSE PLAN

No.	Topic	No. of lectures
1.	Review of complex numbers, complex plane, polar form, powers and roots	1
2.	Regions in the complex plane, topological concepts, Functions of a complex variable, their mapping properties Limits and continuity, derivatives	1
3.	Analytic functions, Cauchy-Riemann equations, Laplace's equation, Riemann sphere and stereographic projection	2.5
4.	Mappings by special functions, conformal mappings	1
5.	Elementary functions: exponential function, logarithmic function, general power, trigonometric and hyperbolic functions	2
6.	Complex integration, line integrals,methods	1.5
7.	Cauchy's integral theorem, Cauchy's integral formula	2
8.	Derivatives of analytic functions, Morera's theorem, Liouville's theorem	1
9.	Power series	1
10.	Taylor series, Taylor's theorem	1.5
11.	Laurent series	1
12.	Singularities and zeros, behavior at infinity	1
13.	Residue and residue theorem	1.5
14.	Evaluation of real integrals, improper integrals	2