

## COURSE SPECIFICATION

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

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|-----|---|---|
| 1.  | <b>Course Title</b>   | Complex Analysis  |
| 2.  | <b>Originating Department</b>   | Department of Mathematics   |
| 3.  | <b>Course Code</b>  | MA202   |
| 4.  | <b>Credit Value</b>   | 3   |
| 5.  | <b>Course Type</b>  | Major Core Courses  |
| 6.  | <b>Semester</b>   | Spring  |
| 7.  | <b>Teaching Language</b>  | English & Chinese   |
| 8.  | <b>Instructor(s), Affiliation &amp; Contact</b><br>For team teaching, please list all instructors | yangjg@impa.br<br>Jiagang YANG, Department of Mathematics, Email: yangjg@impa.br                            |
| 9.  | /<br><b>Tutor/TA(s), Contact</b>  | NA / To be announced / / Please list all<br>Tutor/TA(s)<br><b>Please only keep the relevant information</b> |
| 10. | (      )<br><b>Maximum Optional Enrolment</b>   |   |

|     |   |   |                  |                      |                             |              |
|-----|---|---|------------------|----------------------|-----------------------------|--------------|
| 11. |   |   | / /              | /                    | ( )                         |              |
|     | <b>Delivery Method</b>                                  | <b>Lectures</b>                                   | <b>Tutorials</b> | <b>Lab/Practical</b> | <b>Other Please specify</b> | <b>Total</b> |
|     | <b>Credit Hours</b>                                     | 48  |                  |                      |                             | 48           |
| 12. | <b>Pre-requisites or Other Academic Requirements</b>    | III<br>Mathematical Analysis III or Real Analysis |                  |                      |                             |              |
| 13. | <b>Courses for which this course is a pre-requisite</b> |   |                  |                      |                             |              |
| 14. | <b>Cross-listing Dept.</b>                              |   |                  |                      |                             |              |

### SYLLABUS

#### 15. Course Objectives

The theory of functions of a complex variable is an important branch of modern mathematics. It has wide applications in many braches of mathematics as well as in physics and engineering. This course aims to enable students to understand and grasp the basic theory of functions of a complex variable, learn its applications, and appreciate the beauty of this theory.

#### 16. Learning Outcomes

After completing this course, students should master the basic calculation of functions of a complex variable. They should master the basic concepts such as holomorphic, analytic, and meromorphic functions. They should also master the important theorems such as Cauchy's Theorem, Cauchy's integral formula, the residue formula, and be able to solve problems using these theorems.

#### 17.

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

1. Preliminaries to Complex Analysis (2 hours)
2. Holomorphic functions, Cauchy-Riemann equations, CR (6 hours)
2. Cauchy's Theorem and Its Applications (8 hours)
3. Meromorphic Functions and the Logarithm, residue theorem, (12 hours)
4. Entire Functions (8 hours)
5. Conformal Mappings (10 hours) ( 2 hours )

18. **Textbook and Supplementary Readings**

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| <p>Textbook:</p> <p>Complex Analysis, by Elias M. Stein and Rami Shakarchi, 2013 1</p> <p>Supplementary Readings</p> <p>Complex Analysis: An Introduction to the Theory of Analytic Functions of One Complex Variable, by Lars V. Ahlfors</p> <p>Complex Analysis, by Serge Lang</p> <p>Functions of One Complex Variable, by John B. Conway</p> <p>Complex Variables and Applications, by James Ward Brown and Ruel V. Churchill</p> |
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**ASSESSMENT**

19.

| Type of Assessment                              | Time | % of final score | Penalty | Notes |
|---|------|------------------|---------|-------|
| Attendance                                      |      |                  |         |       |
| Class Performance                               |      |                  |         |       |
| Quiz  |      |                  |         |       |
| Projects  |      |                  |         |       |
| Assignments                                     |      |                  |         |       |
| Mid-Term Test                                   |      |                  |         |       |
| Final Exam                                      |      |                  |         |       |
| Final Presentation                              |      |                  |         |       |
| Others (The above may be modified as necessary) |      |                  |         |       |

20. **GRADING SYSTEM**

|    |                |                   |
|----|----------------|-------------------|
| A. | Letter Grading |                   |
| B. | /              | Pass/Fail Grading |

**REVIEW AND APPROVAL**

21.

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This Course has been approved by the following person or committee of authority

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