

COMPACT RIEMANN SURFACES
CHENNAI MATHEMATICAL INSTITUTE
JANUARY–APRIL 2013

This is a graduate mathematics course, although (because it is actually a dual level course) advanced undergraduates will be welcome with permission of the instructor (email: pramath@cmi.ac.in). This course is not at the research level, but it is expected that students taking this course are preparing for research in mathematics or a related mathematical discipline such as physics. This course would often provide part of the background for preparation for an advanced course in algebraic geometry or in analysis. The grading policies (see below) have been chosen to reinforce these goals.

1. Basic Information

Instructor: Pramath Sastry
Meeting Times: Mondays and Wednesdays 10:30–11:45
Classroom: Lecture Hall 5
Tutorial Times: To be announced
Tutor: Apurv Nakade

2. Course Contents

This is a rough idea of what will hopefully be covered. Depending on the background of the students this could change.

- Quick review of classification of closed surfaces (i.e., compact oriented 2-manifolds without boundary)
- Riemann Surfaces and function fields
- Elliptic functions
- Differential forms
- Weyl's Lemma and Existence Theorem
- Riemann-Roch Theorem
- Serre Duality
- Abel's Theorem
- Jacobi's Theorem

3. Grading Policy and Philosophy

3 Keys to Learning Mathematics

1. Work lots of problems.
2. Memorize the definitions and statements of the major theorems
3. Work lots more problems.

Ordinarily, after mathematicians and scientists complete research on a topic, they write up their results and submit them for publication to an appropriate journal. To be accepted for publication, the work must be interesting, correct, and reasonably well written. For the purposes of this class, all homework problems are, by hypothesis, interesting. After you submit them, they will be accepted if they are correct and reasonably well written. (Note that neither professional journals, your thesis committee, nor this class will accept work that is half correct.)

Publication of jointly authored research in mathematics is frequent and acceptable: the authors do the research together and write up a single account of their work for submission with all their names as authors.

There is an unwritten code of ethics governing joint publication. Whether work discussed with another mathematician is joint or not is determined by the individuals involved by mutual consent. One standard is that the work is jointly authored if the contribution of each author is significant. It is unethical to submit jointly authored work as yours alone. It is equally unethical to include an author who has contributed nothing. Assignment of credit by professional communities for jointly authored work is always problematic and ranges from the generous: each author gets full credit for the whole paper; to the blantly unfair: you get no credit, the other author gets full credit.

Joint authorship of homework will be acceptable in this class (to encourage discussion of the problems among you) and the usual ethical standards and the usual procedures apply: one manuscript with all authors names will be submitted for grading. Credit will be given for a problem only after the problem has been accepted as correct and reasonably well written. For a paper with $n > 1$ authors, credit to each author will be $2/n$, so, for example, for an individually worked problem, the author will get 1 credit; for a problem with two authors, *each* author will receive $2/2 = 1$ credit; whereas for a problem with *three authors*, each author will receive $2/3$ credit.

The course will have a number of HW problems which will be uploaded on a regular basis. The students are expected to hand in at least two problems each week from a list of problems that are given earlier. At certain points in the course, some problems will be frozen, meaning you will not be allowed to submit them after that time (primarily because the solutions to them will be posted). You will be allowed to submit each problem twice—if there are mistakes in either the logic or writing style—unless you are a second year B.Sc student, in which case you are allowed three submissions.

There will be a mid-term and a final exam. The exact break-up of marks will be announced in class once the course gets going, and once the instructor gets a feel of the level of the class.