Syllabus

Title of a Course : Introduction to Riemann Surfaces

(6 ECTS)

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Meeting Minute # ___dated _____ 20_

1. Course Description

a) **Pre-requisites:** Complex analysis, Topology-1, Calculus on manifolds (rudiments)

b) **Abstract :**

The aim of the course is to demonstrate how some of the key ideas of algebraic geometry work, using the approach that does not reaquire a hard technical introduction.

2. Learning Objectives To learn how to work with some basic concepts of algebraic geometry.

3. Learning Outcomes The student will be able to compute genera of compact Riemann surfaces defined as ramified coverings of the projective line or, alternatively, as plane curves, maybe with simple singularities. Besides, the student will learn to work, using Riemann-Roch theorem, with divisors and linear systems on Riemann surfaces defined as above, and to find (in the simplest situations) points of finite order on Jacobians.

4. Course Plan

1. Definitions. Compact Riemann surfaces associated to algebraic equations.

2. Differentials, residues, divisors. Genus of a compact Riemann surface.

3. Compact Riemann surfaces associated to smooth and nodal plane curves. Poincaré residue.

4. Riemann's existence theorem (without proof). Riemann – Roch theorem.

5. Linear systems and line bundles.

6. Canonical curves. Castelnuovo–De Franchis theorem.

7. Jacobian variety. Abel and Jacobi theorems.

8. Theta divisor. Torelli theorem.

5. Reading List

a) **Required:** Otto Foster. Lectures on Riemann surfaces. http://staff.math.su.se/shapiro/UIUC/Foster.pdf

b) **Optional:** Ph.Griffiths, J.Harris. Principles of algebraic geometry. Wiley-Interscience, New York, 1978.

6. Grading System : 0.4(grade for the midterm exam) + 0.6(grade for the final exam). Non-integer grades will be rounded up.

7. Examination Type written**.**

8. Methods of Instruction lectures

9. Special Equipment and Software Support : no requirements

10. Further reading Gunning, R. C. Lectures on Riemann surfaces. Princeton Mathematical Notes Princeton University Press, Princeton, N.J. 1966