MAST90056 Riemann Surfaces and Complex Analysis

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2012.
Time Commitment:	Contact Hours: Two 1-hour lectures and one 1-hour practical class per week Total Time Commitment: 120 hours
Prerequisites:	The following, or equivalent:

Subject	Study Period Commencement:	Credit Points:
MAST30021 Complex Analysis	Semester 1, Semester 2	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering requests for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements for this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Contact:	Dr Paul Norbury Email: **norbury@unimelb.edu.au (mailto:norbury@unimelb.edu.au)**
Subject Overview:	Riemann surfaces arise from complex analysis. They are central in mathematics, appearing in seemingly diverse areas such as differential and algebraic geometry, number theory, integrable systems, statistical mechanics and string theory. The first part of the subject studies complex analysis. It assumes students have completed a first course in complex analysis so begins with a quick review of analytic functions and Cauchy's theorem, emphasising topological aspects such as the argument principle and Rouche's theorem. Topics also include: Schwarz's lemma; limits of analytic functions, normal families, Riemann mapping theorem; multiple-valued functions, differential equations and Riemann surfaces. The second part of the subject studies Riemann surfaces and natural objects on them such as holomorphic differentials and quadratic differentials. Topics may also include: divisors, Riemann-Roch theorem; the moduli space of Riemann surfaces, Teichmueller space; integrable systems.
Objectives:	After completing this subject, students will gain an understanding of: # topological aspects of complex analytic functions; # Riemann mapping theorem and its proof; # Riemann surfaces; # holomorphic differentials and line integrals on Riemann surfaces; # the relevance of this course to further studies in this and related areas.
Assessment:	Assignments during the semester (60%), a 2-hour end-of-semester exam in the examination period (40%).

Prescribed Texts:	None
Recommended Texts:	Ahlfors, Lars V. Complex analysis. An introduction to the theory of analytic functions of one complex variable. Third edition. International Series in Pure and Applied Mathematics. McGraw-Hill Book Co., New York, 1978. Farkas, H. M.; Kra, I. Riemann surfaces. Second edition. Graduate Texts in Mathematics, 71. Springer-Verlag, New York, 1992. Jost, Jürgen. Compact Riemann surfaces. An introduction to contemporary mathematics. Translated from the German manuscript by R. R. Simha. Universitext. Springer-Verlag, Berlin, 1997. Lang, Serge. Complex analysis. Fourth edition. Graduate Texts in Mathematics, 103. Springer-Verlag, New York, 1999. Segal, Sanford L. Nine introductions in complex analysis. Revised edition. North-Holland Mathematics Studies, 208.Elsevier Science B.V., Amsterdam, 2008.
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include: # problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies; # analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis; # collaborative skills: the ability to work in a team; # time-management skills: the ability to meet regular deadlines while balancing competing commitments.
Related Course(s):	Master of Science (Mathematics and Statistics)
Related Majors/Minors/ Specialisations:	Mathematics and Statistics