# MAST90056 Riemann Surfaces and Complex Analysis

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<tr><td>Credit Points:</td><td>12.5</td></tr>
<tr><td>Level:</td><td>9 (Graduate/Postgraduate)</td></tr>
<tr><td>Dates & Locations:</td><td>This subject is not offered in 2016.</td></tr>
<tr><td>Time Commitment:</td><td>Contact Hours: 36 hours comprising three 1-hour lectures per week Total Time Commitment: 170 hours</td></tr>
<tr><td>Prerequisites:</td><td>The following, or equivalent:
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<tr><th>Subject</th><th>Study Period Commencement:</th><th>Credit Points:</th></tr>
<tr><td>MAST30021 Complex Analysis</td><td>Semester 1, Semester 2</td><td>12.50</td></tr>
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<tr><td>Corequisites:</td><td>None</td></tr>
<tr><td>Recommended Background Knowledge:</td><td>None</td></tr>
<tr><td>Non Allowed Subjects:</td><td>None</td></tr>
<tr><td>Core Participation Requirements:</td><td><p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: <a href="http://services.unimelb.edu.au/disability">http://services.unimelb.edu.au/disability</a></p></td></tr>
<tr><td>Contact:</td><td>Email: christian.haesemeyer@unimelb.edu.au (mailto:christian.haesemeyer@unimelb.edu.au)</td></tr>
<tr><td>Subject Overview:</td><td>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.<br><br>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.<br><br>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.<br><br>Topics may also include: divisors, Riemann-Roch theorem; the moduli space of Riemann surfaces, Teichmueller space; integrable systems.</td></tr>
<tr><td>Learning Outcomes:</td><td>After completing this subject, students will gain an understanding of:<br># topological aspects of complex analytic functions;<br># Riemann mapping theorem and its proof;<br># Riemann surfaces;<br># holomorphic differentials and line integrals on Riemann surfaces;<br># the relevance of this course to further studies in this and related areas.</td></tr>
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| **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.<br>Farkas, H. M.; Kra, I. Riemann surfaces. Second edition. Graduate Texts in Mathematics, 71. Springer-Verlag, New York, 1992.<br>Jost, Jürgen. Compact Riemann surfaces. An introduction to contemporary mathematics. Translated from the German manuscript by R. R. Simha. Universitext. Springer-Verlag, Berlin, 1997.<br>Lang, Serge. Complex analysis. Fourth edition. Graduate Texts in Mathematics, 103. Springer-Verlag, New York, 1999.<br>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:<br># problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies;<br># 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;<br># collaborative skills: the ability to work in a team;<br># time-management skills: the ability to meet regular deadlines while balancing competing commitments. |
| **Related Course(s):** | Doctor of Philosophy - Engineering<br>Master of Philosophy - Engineering<br>Master of Science (Mathematics and Statistics) |
| **Related Majors/Minors/ Specialisations:** | Mathematics and Statistics |