MAST30031 Methods of Mathematical Physics

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 one-hour lectures (three per week); 12 one-hour practice classes (one per week) Total Time Commitment: 170 hours
Prerequisites:	One of: **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20030 Differential Equations / Semester 2 / 12.50 MAST30029 Partial Differential Equations (prior to 2014) Plus: **Subject** / **Study Period Commencement:** / **Credit Points:** MAST30021 Complex Analysis / Semester 1, Semester 2 / 12.50 MAST30021 Complex Analysis may be taken concurrently with MAST30031 Methods of Mathematical Physics
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	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. 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: http://services.unimelb.edu.au/disability
Coordinator:	Prof Omar Foda
Contact:	**omar.foda@unimelb.edu.au (mailto:omar.foda@unimelb.edu.au)**
Subject Overview:	This subject builds on, and extends earlier, related undergraduate subjects with topics that are useful to applied mathematics, mathematical physics and physics students, as well as pure mathematics students interested in applied mathematics and mathematical physics. These topics include: # Special functions: Spherical harmonics including Legendre polynomials and Bessel functions, including cylindrical, modified and spherical Bessel functions; # Integral equations: Classification, Fourier and Laplace transform solutions, separable kernels, singular integral equations, Wiener-Hopf equations, and series solutions; # Further vector analysis: Differential forms, and integrating p-forms;

	# Further complex analysis: The Schwarz reflection principle, and Wiener-Hopf in complex variables.
Learning Outcomes:	On completion of this subject, students should: # Be familiar with the most important special functions of mathematical physics, including Legendre polynomials and Bessel functions, and how they arise in solving the Laplace equation in different coordinate systems using separation of variables. # Learn how a physical problem formulated as a differential equation and a set of boundary conditions can be recast as an integral equation, and how that may offer a way to solve the problem that is not available in the original formulation. # Be familiar with differential forms as tools that allow one to solve physical problems with maximal notational simplicity. # Learn new, fundamental concepts that extend the basic concepts of a first subject in complex analysis to allow for the solution of more sophisticated physical problems.
Assessment:	Three written assignments of up to 60 pages due at regular intervals during the semester (30%); 3-hour written exam in the examination period (70%)
Prescribed Texts:	None
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 skills that are useful in careers in science, engineering, commerce and education, students will develop useful generic skills that include: # The problem-solving skills of identifying strategies to solve unfamiliar problems; # The analytic skills of constructing and expressing logical arguments, and of working in abstract, general terms to clarify and improve available solutions; # The time-management skills of meeting regular deadlines while balancing competing commitments.
Related Majors/Minors/ Specialisations:	Applied Mathematics Applied Mathematics Applied Mathematics Applied Mathematics Applied Mathematics (specialisation of Mathematics and Statistics major) Mathematical Physics Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED