

COURSE SPECIFICATION FORM

DEPARTMENT OF: Mathematics				Academic Session: 2017-18	
Course Code:	MT3220	Course Value:	0.5	Status: (ie:Core, or Optional)	Optional
Course Title:	Dynamics of Real Fluids			Availability: (state which teaching terms)	
Prerequisites:	MT2220			Recommended:	
Co-ordinator:					
Course Staff					
Aims:	This course aims to give an overview of how the theory of ideal fluids met in MT222 can be extended to a more realistic model. It will show how the equations can be solved in simple cases and how other methods such as conservation laws and dimensional analysis can be used in more complicated cases.				
Learning Outcomes:	<p>On completion of the course the student should be able to:</p> <ul style="list-style-type: none"> • demonstrate an understanding of the essential features of compressible flow, sound waves and shock waves; • tackle a variety of problems involving surface waves on a liquid; • solve simple problems in viscous flows; • apply appropriately and with confidence basic vector analysis techniques and the additional general mathematical techniques introduced in this course. 				
Course Content:	<p>Compressible flow: Relation between pressure and density. Linear small amplitude waves in a gas and possible solutions of the wave equation. Plane and spherical waves. Waves in pipes: harmonics and normal modes. Shock waves.</p> <p>Surface waves on a liquid: Small amplitude waves on a fluid of arbitrary depth. Stationary waves on a moving stream. Waves on an interface. What happens if wave speed depends upon wavelength: dispersion and group velocity.</p> <p>Viscous fluids: Discussion of the effects of viscosity by means of a stress tensor leading to the extra terms that need to be included in the equation of motion. Problems for which exact solutions can be found. The Reynolds number as a measure of the importance of viscosity.</p>				
Teaching & Learning Methods:	33 hours of lectures and examples classes. 117 hours of private study, including work on problem sheets and examination preparation. This may include discussions with the course leader if the student wishes.				
Key Bibliography:	A First Course in Fluid Dynamics – A R Paterson (CUP 1983). <i>Library Ref. 532.05 PAT</i> Fluid Mechanics – P K Kundu and I M Cohen (Academic Press 2004) <i>Library Ref. 532 KUN</i>				
Formative Assessment & Feedback:	Formative assignments in the form of 8 problem sheets. The students will receive feedback as written comments on their attempts.				
Summative Assessment:	<p>Exam (%) A two-hour paper: 100%</p> <p>Coursework (%) None</p>				

Updated September 2017

The information contained in this course outline is correct at the time of publication, but may be subject to change as part of the Department's policy of continuous improvement and development. Every effort will be made to notify you of any such changes.