

**COURSE SPECIFICATION FORM**  
for new course proposals and course amendments

<b>DEPARTMENT OF MATHEMATICS</b>				<b>Academic Session: 2020-21</b>	
<b>Course Code:</b>	MT5461	<b>Course Value:</b>	200 h	<b>Status:</b> (ie: Core, or Optional)	Mandatory for MCC MSc
<b>Course Title:</b>	Error-Correcting Codes			<b>Availability:</b> (state which teaching terms)	Term 2
<b>Prerequisites:</b>	Undergraduate courses in linear algebra and finite fields			<b>Recommended:</b>	None
<b>Co-ordinator:</b>					
<b>Course Staff:</b>					
<b>Learning Objectives:</b>	To provide an introduction to the theory of error correcting codes employing the methods of elementary enumeration, linear algebra and finite fields.				
<b>Learning Outcomes:</b>	<p>On completion of the module, students should be able to: calculate the probability of error of the necessity of retransmission for a binary symmetric channel with given cross-over probability, with and without coding; prove and apply various bounds on the number of possible code words in a code of given length and minimal distance; use MOLSs and Hadamard matrices to construct large linear codes of certain parameters; reduce a linear code to standard form, finding a parity check matrix, building standard array and syndrome decoding tables, including for partial decoding; understand, prove, and apply a key theorem for cyclic codes over a field; understand the structure of BCH codes.</p> <p>The student will demonstrate a breadth of understanding appropriate for an M-level course.</p>				
<b>Teaching &amp; Learning Methods:</b>	40 hours of lectures. 160 hours of private study, including work on problem sheets and examination preparation. This may include discussions with the course leader if the student wishes.				
<b>Key Bibliography:</b>	A First Course in Coding Theory – R Hill (OUP). 001.539 HIL Coding Theory – a First Course – S Ling and C Xing (Cambridge UP 2004) 001.539 LIN				
<b>Formative Assessment &amp; Feedback:</b>	Formative assignments in the form of 8 problem sheets. The students will receive feedback as written comments on their attempts.				
<b>Summative Assessment:</b>	<b>Exam (%)</b> A two-hour written exam: 85%  <b>Coursework (%)</b> Set exercises. 15%				