COURSE SPECIFICATION FORM
for new course proposals and course amendments

Department/School:	**Mathematics**	**Academic Session:**	**2017-18**
Course Title:	Advanced Financial Mathematics	**Course Value:** (UG courses = unit value, PG courses = notional learning hours)	0.5 unit
Course Code:	MT4480	**Course JACS Code:** (Please contact Data Management for advice)	G100
Availability: (Please state which teaching terms)	Term 2	**Status:**	Mandatory for Finance & Mathematics; optional for all other programmes Condonable
Pre-requisites:	MT3470	**Co-requisites:**	-
Co-ordinator:	-		
Course Staff:	-		
Aims:	To investigate the validity of various linear and non-linear time series occurring in finance; To extend the use of stochastic calculus to interest rate movements and credit rating;		
Learning Outcomes:	1. Make use of some of the ARCH (autoregressive conditionally heteroscedastic) family of models in time series; 2. Appreciate the ideas behind the use of the BDS test and the bispectral test for time series. 3. Understand the partial differential equation for interest rates and the assumptions that lead to it; 4. Be able to model forward and spot rates; 5. See how to model the prices for certain exotic options. 6. Demonstrate a breadth of understanding appropriate for an M-level course.		
Course Content:	Financial time series: Linear time series: ARMA and ARIMA models, stationarity, autoregressions. Testing of linearity, using spectral analysis. ARCH and GARCH models. Structure of financial series: The random walk model, trend and volatility, moments. Comparison with chaotic systems, dimensionality and memory effects in financial series. The nearest neighbour algorithm and the BDS test. Interest rate analysis: Revision of ideas in stochastic calculus. Modelling of interest rates, the bond pricing equation. Bond derivatives. The Heath-Jarrow-Morton model. Exotic options: Asian and barrier options.		
Teaching & Learning Methods:	The total number of notional learning hours associated with this course are 150. 3 hours of lectures a week over 11 weeks. Total 33 hours. 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:	Paul Wilmott Introduces Quantitative Finance – P Wilmott (Wiley 2007) Library reference 332.632 WIL Analysis of Financial Time Series – R S Tsay (Wiley 2005) Library reference 330.0151 TSA		
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:	**Exam:** 100% Written exam. A two hour paper.		

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