

H9FINA: Financial Analytics

Module Code:	H9FINA
Long Title	Financial Analytics APPROVED
Title	Financial Analytics
Module Level:	LEVEL 9
EQF Level:	7
EHEA Level:	Second Cycle
Credits:	10
Module Coordinator:	MICHAEL BRADFORD
Module Author:	Simon Caton
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Investigate and evaluate key concepts and financial analytics techniques and assess when to apply such techniques in practical situations
LO2	Critically assess models used in financial analytics
LO3	Contextualise, research and utilise analytical models associated with financial data in order to develop strategies for pricing
LO4	Critically review current research and assess research methods applied in the field of financial analytics
Dependencies	
Module Recommendations	
No recommendations listed	
Co-requisite Modules	
No Co-requisite modules listed	
Entry requirements	

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Module Content & Assessment

Indicative Content
Introduction • A review of fundamental financial data analysis techniques • Emerging financial analytics methods for FinTech • Selected exemplary case studies • Evaluating Financial Models • Core use cases of financial analytics in FinTech and Financial Markets
Methods for Data Analysis • Singular value decomposition • Feature engineering + variable selection • Dimensionality reduction: Linear discriminant analysis, principal component analysis, barycentric discriminant analysis, multiple correspondence analysis • Data fusion
Financial Time Series • Granger causality • ARMA, ARIMA, Box-Jenkins Methodology • Nowcasting and forecasting
Classification Methods for Fintech • Bayesian statistics and classifiers • Artificial Neural Networks and Deep Learning
Stochastic Processes • Random Walks & Martingales • Binomial Processes • Brownian Motion • Poisson, Weiner & Ito Processes
Pricing & Volatility • Option Pricing & the Black-Scholes Model • Volatility Estimators (e.g., Garman-Klass, Rodgers-Satchel, Yang-Zhang) • Garch Model
Risk and Portfolios • Measurement of Beta, comparative beta, testing market efficiency with regression analysis and with pivot tables. • Value at Risk measurement: variance covariance, historical simulation, principal component analysis, Monte Carlo simulation. • Expected Tail Loss: parametric and historic simulation Backtesting of VaR and Expected Tail Loss models • Mean-variance portfolio selection (mean-/semi-variance portfolios, Back-testing portfolio performance, research on portfolio selection, bond portfolio selection, term structure estimation, capital budgeting). • Applied machine learning, and big data analytics
High Performance Computing for FinTech • Facilitating High Performance FinTech Models • Big Data Platforms (e.g. h2o.ai) • Cloud Platforms (e.g. EMR, Watson)

Assessment Breakdown	%
Coursework	40.00%
End of Module Assessment	60.00%

Assessments

Full Time			
Coursework			
Assessment Type:	Project	% of total:	40
Assessment Date:	n/a	Outcome addressed:	1
Non-Marked:	No		
Assessment Description: Learners will undertake a significant team-based analytics project			
End of Module Assessment			
Assessment Type:	Terminal Exam	% of total:	60
Assessment Date:	End-of-Semester	Outcome addressed:	1,2,3
Non-Marked:	No		
Assessment Description: The examination will be a minimum of two hours in duration and may include a mix of: short answer questions, vignettes, essay based questions and case study based questions. Marks will be awarded based on clarity, appropriate structure, relevant examples, depth of topic knowledge, and evidence of outside core text reading.			
No Workplace Assessment			
Reassessment Requirement			
Repeat examination <i>Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.</i>			

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Module Workload				
Module Target Workload Hours 0 Hours				
Workload: Full Time				
Workload Type	Workload Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	No Description	24	Every Week	24.00
Tutorial	No Description	24	Every Week	24.00
Independent Learning	No Description	202	Every Week	202.00
Total Weekly Contact Hours				48.00
Workload: Part Time				
Workload Type	Workload Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	No Description	24	Every Week	24.00
Tutorial	No Description	24	Every Week	24.00
Independent Learning	No Description	202	Every Week	202.00
Total Weekly Contact Hours				48.00

Module Resources	
<i>Recommended Book Resources</i>	
<p>John L. Teall. (1999), Financial Market Analytics, Quorum Books, p.328, [ISBN: 9781567201987].</p> <p>R. Tsay. (2010), Analysis of Financial Time Series, John Wiley & Sons, Hoboken, [ISBN: 9780470414354].</p> <p>Giuseppe Campolieti, Roman N. Makarov.. (2014), Financial mathematics: A Comprehensive Treatment, Boca Raton; CRC Press, [ISBN: 9781439892428].</p> <p>Ansgar Steland. (2012), Financial Statistics and Mathematical Finance: Methods, Models and Applications, Wiley, p.432, [ISBN: 9780470710586].</p>	
<i>Supplementary Book Resources</i>	
<p>A. Arratia. (2014), Computational Finance: An Introductory Course with R, Atlantis Press, [ISBN: 9789462390690].</p> <p>James Wu, Stephen Coggeshall. (2012), Foundations of Predictive Analytics, Chapman and Hall/CRC, p.337, [ISBN: 9781439869468].</p>	
<i>This module does not have any article/paper resources</i>	
<i>This module does not have any other resources</i>	
Discussion Note:	