

## H9QMF: Quantitative Methods in Finance

<b>Module Code:</b>	H9QMF	
<b>Long Title</b>	Quantitative Methods in Finance <b>APPROVED</b>	
<b>Title</b>	Quantitative Methods in Finance	
<b>Module Level:</b>	LEVEL 9	
<b>EQF Level:</b>	7	
<b>EHEA Level:</b>	Second Cycle	
<b>Credits:</b>	5	
<b>Module Coordinator:</b>	CORINA SHEERIN	
<b>Module Author:</b>	CORINA SHEERIN	
<b>Departments:</b>	School of Business	
<b>Specifications of the qualifications and experience required of staff</b>		
<b>Learning Outcomes</b>		
<i>On successful completion of this module the learner will be able to:</i>		
<b>#</b>	<b>Learning Outcome Description</b>	
LO1	Critically appraise mathematical principles, theories and paradigms underpinning financial calculations and apply these principles in a range of business decision making situations.	
LO2	Defend and interpret the use of statistical techniques and measures in the portfolio construction process and hence allocate funds to form an optimal portfolio cognisant of individual and investor preferences regarding return requirements and risk tolerance.	
LO3	Critique, select and apply appropriate probability distributions to be used within various scenarios and compute probabilities using the Binomial, Normal and Poisson distributions.	
LO4	Define and formulate a sampling distribution of the sample mean and apply the Central Limit theorem in the development of inferences about a population.	
LO5	Synthesise data and analyse business problems under conditions of uncertainty, formulate null and alternative hypotheses and exercise critical judgement and discrimination in the resolution of complex problematic situations using hypothesis testing.	
LO6	Formulate ideas in an abstract manner using analysis of variance (ANOVA) and critically evaluate the relevance and importance of underlying assumptions in the modelling process.	
LO7	Demonstrate proficiency in the use and application of a range of quantitative tools and techniques using appropriate software to conduct their own empirical investigations into financial issues.	
<b>Dependencies</b>		
<b>Module Recommendations</b>		
69064	H9QMF	Quantitative Methods in Finance
<b>Co-requisite Modules</b>		
No Co-requisite modules listed		
<b>Entry requirements</b>	There are no additional entry requirements for this module. The programme entry requirements apply.	

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Module Content & Assessment	
<b>Indicative Content</b>	
<b>Mathematics and Statistical Foundations</b> Functions Differential Calculus	
<b>Statistical Concepts and Market Returns</b> Fundamental Concepts: Populations and Samples Variables and Measurement Scales Summarising Data: Measures of Centre and Dispersion Coefficient of Variation, Skewness, Kurtosis	
<b>Introduction to Portfolio Allocation</b> Risk and Return of a Two Stock Portfolio Risk and Return of a Three Stock Portfolio Correlation and Covariance The Efficient Frontier Markowitz Theory	
<b>Fundamentals of Probability</b> The role of Probability in Financial Markets Random Variables and their Probability Distributions Discrete Random Variables Continuous Random Variables Joint Distributions, Conditional Distributions, Independence	
<b>Probability Distributions</b> Normal/Standard Normal Distribution Binomial Distribution Chi Square Distribution The T Distribution The F Distribution The Application of Probability Distributions within Finance	
<b>Sampling &amp; Estimation</b> Sampling Methods Distribution of the Sample Mean: Central Limit Theorem Point Estimates and Confidence Intervals Sampling Biases: Data Mining, Sample Selection, Look Ahead	
<b>Hypothesis Testing</b> Hypothesis Testing: An Introduction Hypothesis Tests: The Mean (Single Mean, Differences between Mean, Mean Differences) Hypothesis Tests: Variance (Single Variance, Equality (Inequality) of Two Variances)	
<b>Analysis of Variance</b> Single Test of Variance Comparing Population Variances Analysis of Variance (ANOVA) Assumptions ANOVA Test	
<b>Assessment Breakdown</b>	<b>%</b>
Coursework	40.00%
End of Module Assessment	60.00%
<b>Assessments</b>	
<b>Full Time</b>	
<b>Coursework</b>	
<b>Assessment Type:</b>	Continuous Assessment <b>% of total:</b> 40
<b>Assessment Date:</b>	n/a <b>Outcome addressed:</b> 2,3,5,6,7
<b>Non-Marked:</b>	No
<b>Assessment Description:</b> The continuous assessment may take the form of a large-scale data-based project; a technical report; or a detailed problem set based assignment which may contain case study data or an class test. Presentations may also be used in conjunction with any of the aforementioned assessment methods where appropriate. The exact nature of the assessment will be decided annually by the programme team bearing in mind contemporary financial issues and how best to situate a quantitative task. The continuous assessment element of this module will assess both theoretical and analytical skills as undertaken on the module and candidates must demonstrate skills of analysis and interpretation of data regardless of the form of assessment. Depending on the scale and nature of the task, this may take the form of a group assessment. An example of such would be whereby a group of learners are asked to select five years of daily data for four stocks from a selected stock exchange and develop a technical report critically evaluating the performance of the stocks over the timeframe from both an individual as well as a relative perspective. Learners would be required to present a detailed technical report of findings.	
<b>End of Module Assessment</b>	
<b>Assessment Type:</b>	Terminal Exam <b>% of total:</b> 60
<b>Assessment Date:</b>	End-of-Semester <b>Outcome addressed:</b> 1,2,3,4,5,6
<b>Non-Marked:</b>	No
<b>Assessment Description:</b> The examination will be a minimum of two hours in duration and may include a mix of: short or long problem-based questions, vignettes, essay-based questions and case study-based questions. All questions will be marked according to clarity, structure, contemporary examples (that illustrate points made), reference to materials covered, theories and research in the field. Reference to class material and evidence of outside reading is essential.	
No Workplace Assessment	
<b>Reassessment Requirement</b>	
<b>Repeat examination</b> <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>	
<b>Reassessment Description</b> Repeat assessment of this module will consist of a repeat examination which will test all the learning outcomes.	

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<b>Module Workload</b>				
<b>Module Target Workload Hours 0 Hours</b>				
<b>Workload: Full Time</b>				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Classroom and demonstrations	36	Per Semester	3.00
Directed Learning	Directed e-learning	36	Per Semester	3.00
Independent Learning	Independent learning	178	Per Semester	14.83
Total Weekly Contact Hours				6.00

## Module Resources

### Recommended Book Resources

- DeFusco, R.A., McLeavey, D.W., Pinto, J.E., Runkle, D.E. and Anson, M.J., (2020). Quantitative Investment Analysis. Wiley Publications (Chartered Financial Analyst <sup>TM</sup>).
- Elton, R.J., Gruber, M.J., Brown, S., Goetzmann, W.N. (2014), Modern Portfolio Theory and Investment Analysis, 9th ed., Wiley Publications (e-book available)..
- Render, B., Stair, R.M., Hale, T., (2018) Quantitative Analysis for Management, 13th ed., Pearson Publications..
- Koop, G. (2013), Analysis of Economic Data, Wiley Publications..
- Jones, C.P. (2012), Investment Analysis and Management, 12th Ed., Wiley Publications.
- Davison, M. (2014), Quantitative Finance: A Simulation Based Introduction Using Excel, Chapman and Hall/CRC..

### Supplementary Book Resources

- Jacques, I. (2018), Mathematics for Economics and Business, 9th ed., FT Prentice Hall..
- Rivera, R., (2020), Principles of Managerial Statistics and Data Science, Wiley Publications..
- Brandimarte, P., (2017), An Introduction to Financial Markets: A Quantitative Approach. Wiley Publications..

### Recommended Article/Paper Resources

- Journal of Finance.
- Journal of Quantitative Finance.
- Quarterly Journal of Finance.
- Journal of Economics and Finance.
- Journal of Banking and Finance.
- The European Journal of Finance.
- Journal of Current Issues in Finance, Business and Economics.

### Other Resources

- [Website], <http://www.economist.com>.
- [Website], <http://www.ft.com>.
- [Website], <http://www.wsj.com>.
- [Website], <http://www.bloomberg.com>.
- [Website], <http://www.reuters.com>.
- [Website], <http://www.centralbank.ie>.
- [Website], [www.imf.org](http://www.imf.org).
- [Website], <http://epp.eurostat.ec.europa.eu/>.

### Discussion Note: