

## THE EDUCATION UNIVERSITY OF HONG KONG

### Course Outline

#### Part I

<b>Programme Title</b>	<b>: Master of Arts in Personal Finance Education</b>
<b>Programme QF Level</b>	<b>: 6</b>
<b>Course Title</b>	<b>: Quantitative Analysis for Financial Studies</b>
<b>Course Code</b>	<b>: BUS6032</b>
<b>Department</b>	<b>: Social Sciences</b>
<b>Credit Points</b>	<b>: 3</b>
<b>Contact Hours</b>	<b>: 39</b>
<b>Pre-requisite(s)</b>	<b>: Nil</b>
<b>Medium of Instruction</b>	<b>: English</b>
<b>Course Level</b>	<b>: 6</b>

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#### Part II

The University's Graduate Attributes and seven Generic Intended Learning Outcomes (GILOs) represent the attributes of ideal EdUHK graduates and their expected qualities respectively. Learning outcomes work coherently at the University (GILOs), programme (Programme Intended Learning Outcomes) and course (Course Intended Learning Outcomes) levels to achieve the goal of nurturing participants with important graduate attributes.

In gist, the Graduate Attributes for Undergraduate, Taught Postgraduate and Research Postgraduate participants consist of the following three domains (i.e. in short "PEER & I"):

- Professional Excellence;
- Ethical Responsibility; &
- Innovation.

The descriptors under these three domains are different for the three groups of participants in order to reflect the respective level of Graduate Attributes.

The seven GILOs are:

1. Problem Solving Skills
2. Critical Thinking Skills
3. Creative Thinking Skills
- 4a. Oral Communication Skills
- 4b. Written Communication Skills
5. Social Interaction Skills
6. Ethical Decision Making
7. Global Perspectives

### 1. Course Synopsis

This course develops the fundamental numerical and statistical methods that participants need to conduct quantitative analysis in finance. The course covers basics of calculus used in financial modelling. Topics in linear algebra which include systems of linear equations, matrix multiplication, determinants and matrix inversion with applications in finance. Participants will also learn probability, statistical inference, tests of hypotheses with applications for financial data analysis.

### 2. Course Intended Learning Outcomes (CILOs)

*Upon completion of this course, participants will be able to:*

- CILO<sub>1</sub> compute and use basic mathematical techniques including calculus and matrix algebra;
- CILO<sub>2</sub> critically review, choose and employ the basic statistical concepts and descriptive analysis of data;
- CILO<sub>3</sub> apply the concepts of random variables and probability distributions of financial data;
- CILO<sub>4</sub> apply regression models to financial data analysis;
- CILO<sub>5</sub> formulate implications and conclusions from statistical analysis;

### 3. Content, CILOs and Teaching & Learning Activities

Course Content	CILOs	Suggested Teaching & Learning Activities
Basic mathematical techniques: matrix algebra; differentiation; optimization.	<i>CILO<sub>1</sub></i>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices and calculations; group discussions
Descriptive statistics: introduction to the types (time series, cross-section, panel, continuous, discrete) and major sources of data that are commonly used in finance, measures of central tendency and dispersion, as well as correlation.	<i>CILO<sub>2,3</sub></i>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices and calculations; group discussions
Probability; discrete and continuous random variables; expectation and variance; joint probability distributions; covariance, correlation, and independence; linear combinations of	<i>CILO<sub>3,4</sub></i>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices

random variables; the normal, and $F$ distributions.		and calculations; group discussions
Sampling: samples and populations; random sampling; the distribution of the sample mean; point estimation; properties of estimators (unbiasedness, efficiency); confidence interval estimation.	<i>CILO</i> <sub>2,3,4,5</sub>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices and calculations; group discussions
Hypotheses testing: null and alternative hypotheses; type one and type two errors; test procedures; applications to single samples, two independent samples, two correlated samples.	<i>CILO</i> <sub>3,4,5</sub>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices and calculations; group discussions
Introduction to the usefulness of matrix algebra in regression analysis.	<i>CILO</i> <sub>1,4,5</sub>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; group discussions
Simple regression analysis: the mechanics of ordinary least squares (OLS) regression and its assumptions; standard errors; hypothesis tests and confidence intervals; total, explained and residual sums of squares, $R^2$ . An introduction to multiple regression analysis. Tests based on the $F$ distribution. The usefulness of dummy variables. Applying and running a regression in excel.	<i>CILO</i> <sub>4,5</sub>	Lecture; lecturer-led questions and answers (Q&A); problem-based learning activities; hand-on practices and calculations; group discussions

#### 4. Assessment

Assessment Tasks	Weighting (%)	CILO
(a) Individual Assignments Participants will be given individual assignment(s) on the topics discussed in quantitative analysis during the course	40%	<i>CILO</i> <sub>1,2,3,4,5</sub>
(b) Final Examination A 2-hour examination will be conducted	40%	<i>CILO</i> <sub>1,2,3,4,5</sub>

at the end of the course		
(c) Class Discussion and Participation Participants are expected to read relevant readings before s/he attends the classes and participate actively in the discussion	20%	<i>CILO</i> <sub>1,2,3,4,5</sub>

## 5. Required Text(s)

Nil

## 6. Recommended Readings

- Blyth, S. (2014). *An Introduction to Quantitative Finance*. Oxford: Oxford University Press.
- DeFusco, R.A. et al. (2015). *Quantitative Investment Analysis*. Hoboken, N.J.: John Wiley & Sons.
- Ewen, D. (2015). *Elementary Technical Mathematics*. Cengage Learning.
- Harrison, M. & Waldron. P. (2011). *Mathematics for Economics and Finance*. New York: Routledge.
- Lay, D. C. (2012). *Linear Algebra and Its Applications* (4th ed.). Pearson.
- Mazzoni, T. (2019). *A First Course in Quantitative Finance*. Cambridge University Press.
- Slater, J., Wittry. S.M. (2019). *Math for Business and Finance: an algebraic approach*. New York: McGraw-Hill Education.
- Ruppert, D. (2004). *Statistics and Finance: An Introduction*. Springer.
- Steland, A. (2012). *Financial Statistics and Mathematical Finance: Methods, Models and Applications*. Chichester, West Sussex: Wiley.
- Ting, C.H.A. (2016). *An Introduction to Quantitative Finance: A Three-Principle Approach*. New Jersey; Hong Kong: World Scientific.

## 7. Related Web Resources

- WILMOTT [www.wilmott.com](http://www.wilmott.com)
- OpenIntro Statistics [www.openintro.org/stat/](http://www.openintro.org/stat/)
- QuantLib [www.quantlib.org](http://www.quantlib.org)
- Web Center for Social Research Methods <https://www.socialresearchmethods.net/>

## 8. Related Journals

- The Journal of Financial and Quantitative Analysis*
- Quantitative Finance*
- Mathematical Finance*
- Journal of Finance*
- International Journal of Qualitative Methods*
- Review of Quantitative Finance and Accounting*
- The Review of Financial Studies*

## 9. Academic Honesty

The University adopts a zero tolerance policy to plagiarism. For the University's policy on plagiarism, please refer to the *Policy on Academic Honesty, Responsibility and Integrity with Specific Reference to the Avoidance of Plagiarism by Participants* (<https://www.eduhk.hk/re/modules/downloads/visit.php?cid=9&lid=89>). Participants should familiarize themselves with the Policy.

## **10. Others**

Nil