THE EDUCATION UNIVERSITY OF HONG KONG

Course Outline

Part I

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

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 Sub-degree, Undergraduate, Taught Postgraduate, Professional Doctorate and Research Postgraduate students consist of the following three domains (i.e. in short "PEER & I"):
- **P**rofessional **E**xcellence;
- **E**thical **R**esponsibility; **&**
- **I**nnovation.

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 (CILO$_s$)

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

CILO$_1$ compute and use basic mathematical techniques including calculus and matrix algebra;

CILO$_2$ critically review, choose and employ the basic statistical concepts and descriptive analysis of data;

CILO$_3$ apply the concepts of random variables and probability distributions of financial data;

CILO$_4$ apply regression models to financial data analysis;

CILO$_5$ 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.	*CILO$_1$*	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.	*CILO$_{2,3}$*	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	*CILO$_{3,4}$*	Lecture; lecturer-led questions and answers (Q&A); problem-based

independence; linear combinations of random variables; the normal, and F distributions.		learning activities; hand-on practices 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.	$CILO_{2,3,4,5}$	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.	$CILO_{3,4,5}$	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.	$CILO_{1,4,5}$	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.	$CILO_{4,5}$	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%	$CILO_{1,2,3,4,5}$

(b) Final Examination A 2-hour examination will be conducted at the end of the course	40%	$CILO_{1,2,3,4,5}$
(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%	$CILO_{1,2,3,4,5}$

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
OpenIntro Statistics	www.openintro.org/stat/
QuantLib	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 Quantiative Finance and Accounting
The Review of Financial Studies

9. Academic Honesty

The University upholds the principles of honesty in all areas of academic work. We expect our students to carry out all academic activities honestly and in good faith. Please refer to the Policy on Academic Honesty, Responsibility and Integrity (https://www.eduhk.hk/re/uploads/docs/0000000000016336798924548BbN5). Students should familiarize themselves with the Policy.

10. Others

Nil