

# **Syllabus BT4016 (AY22/23 Sem 2)**

## **Risk Analytics for Financial Services**

This module (BT4016) exposes students to fundamentals of risk analytics in the financial service sector. Students will learn about:

- 1] financial risk metrics (volatility, VaR, crash risk, etc.);
- 2] statistical risk modeling and analytics for stocks, bonds, asset portfolios, and other types of financial derivatives (including options, futures and swaps);
- 3] interest risk analytics and credit risk analytics.

### Instructor and tutors:

Frank XING, fxing@comp.nus.edu.sg

TA1: Qi Qi; TA4: SUN Yichen; TA3: SUN Jiaze

### Course credits and logistics:

4 credit units, weekly

L1: Thu 12:00-14:00 (location: COM1-0206)

T1: Thu 14:00-15:00; T2: Thu 15:00-16:00; T3: Thu 16:00-17:00; T4: Fri 11:00-12:00

(all tutorial locations: I3-0344)

Final exam date: 27 APR 2023 09:00-11:00

### Prerequisites:

- BT2101 “Econometrics Modeling for Business Analytics”
- BT2102 “Data Management and Visualisation”

### ILO (Intended learning objectives):

- Understand the fundamentals of financial risk management and financial instruments.
- Develop the competency in applying analytics for financial services using analytical tools.
- Develop the know-how of building analytical models using financial datasets.

### Assessment:

Participation (5%)

Assignment (15%)

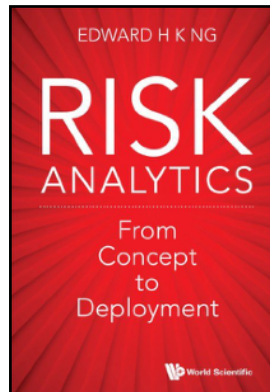
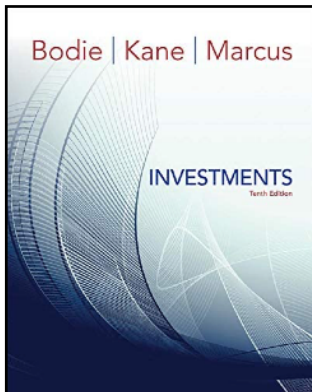
Practice Questions (4\* 3% = 12%)

Course project (28%)

Final Exam (40%)

Reference materials:

- 1> Investments: Tenth Edition (BKM, 2014)
- 2> Risk Analytics: From Concept to Deployment (RA, 2021)
- 3> Course materials (lecture and tutorial slides)

Tentative Lesson Plan:

Week and Date	Lecture Topic	Tutorial Topic	Reference Chapters	Dues
Week 1	Introduction to Risk and Return	*****	BKM Ch 5	*****
Week 2	Portfolio Theory and CAPM	*****	BKM Ch 6,7,8,9	*****
Week 3	Stock Valuation and Efficient Market Hypothesis	Hands on volatility and betas	BKM Ch 10,11,18	*****
Week 4	VaR and ES (I)	Hands on portfolio optimization		Q1
Week 5	VaR and ES (II)	Hands on estimation		Project team within tutorials
Week 6	Basics of Fixed Income Securities	Hands on backtesting	BKM Ch 14,15	Q2
Recess Week	*****	*****	*****	*****

Week 7	Options: Pay-off and Pricing	Bond valuation	BKM Ch 20	Assignment
Week 8	Options: Put-Call Parity	Simulating options	BKM Ch 21	*****
Week 9	Predicting Financial Distress: Z-Score	BS pricing model		Q3
Week 10	Option Risk Management	Loan default prediction	*****	*****
Week 11	Futures, Swap and Risk Management	Consultation and PQ review	BKM Ch 22,23	Q4
Week 12	NUS Wellbeing day break	*****	*****	*****
Week 13	Credit Risk and Review for final exam	*****	*****	Project Report

\* Due dates of assignment (W7 Fri) and team project (W13 Fri) are strict and no extension will be made.