COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	FINANCIAL AND MANAGEMENT ENGINEERING		
LEVEL OF STUDIES	UNDERGRATUATE		
COURSE CODE	MH0108	SEMESTER	8
COURSE TITLE	STOCHASTIC MODELS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
Lectures	3	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background/ Specialised general knowledge/Skills development
PREREQUISITE COURSES:	Prerequisite knowledge from Courses: Probabilities, Statistics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	http://www.fme.aegean.gr/en/c/stochastic-models

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is to provide the students with the appropriate mathematical background of stochastic models that can be applied in finance.

A successful student should be able to:

- comprehend the concept of Financial Derivatives
- perform Forwards ,Futures and Options pricing
- understand the concept of Risk Neutral Probability Measure
- understand and use martingales
- perform option pricing in discrete time using the binomial model
- comprehend option pricing in continuous time

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Project planning and management

Respect for difference and multiculturalism

Adapting to new situations *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Working in an international environment
- Working in an interdisciplinary environment
- Production of new research ideas
- Project planning and management
- Respect for difference and multiculturalism
- Production of free, creative and inductive thinking

(3) SYLLABUS

- Equities, Bonds, Stock Market
- Financial Derivatives
- Types of Traders (Hedgers, Speculators Arbitrageurs), Investment Strategies (Bull spread, Bear spread, Butterfly Spread, Straddle, Strip and Strap, Strangles)
- Simple, Discount, Compound interest, Present Value Analysis
- Forwards and Futures pricing
- Option pricing and Hedging – One-period Binomial Model
- Risk neutral Probability Measure
- σ-algebra, Measure, , Stochastically Independent Events, Conditional Expectation , Stochastic Process
- Martingales
- Dynamic Portfolio, Self-financing Portfolio in discrete time, Mutliperiod Binomial Model, No-arbitrage pricing in Mutliperiod Binomial Model
- Brownian Motion, Geometric Brownian
- Black-Scholes Formula
- Applications of Black-Scholes Formula

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	

Use of ICT in teaching	YES	Electronic Lecture Notes, Exercises
Use of ICT in laboratory education	NO	-
Use of ICT in communication with students	YES	Announcements, Email

TEACHING METHODS	*Activity*	*Semester workload*

The manner and methods of teaching are described in detail. *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Lectures: 39 Study and analysis of bibliography: 18 Non-directed study: 70 Final Exams: 3 Course total: ***130***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Final Exams in Greek = 100%

(5) ATTACHED BIBLIOGRAPHY

A) Suggested Bibliography in Eudoxus

[Επιλογή 1]: ΣΤΟΧΑΣΤΙΚΑ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΑ, Βασιλείου Παναγιώτης – Χρήστος, **Κωδικός Βιβλίου στον Εύδοξο: 11280**, Έκδοση: 1η έκδ./2001,Συγγραφείς: Βασιλείου Παναγιώτης – Χρήστος, ISBN: 960-431-715-6, Τύπος: Σύγγραμμα, Διαθέτης (Εκδότης): Ζήτη Πελαγία & Σια Ι.Κ.Ε. (in Greek)

[Επιλογή 2]: ΣΤΟΙΧΕΙΩΔΗΣ ΕΙΣΑΓΩΓΗ ΣΤΑ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΑ ΜΑΘΗΜΑΤΙΚΑ, ROSS CHELDOM, Κωδικός Βιβλίου στον Εύδοξο: 4659, Έκδοση: 1η/2007, Συγγραφείς: ROSS CHELDOM, ISBN: 978-960-8396-38-8, Τύπος: Σύγγραμμα, Διαθέτης (Εκδότης): ΕΤΑΙΡΙΑ ΑΞΙΟΠΟΙΗΣΗΣ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗΣ ΠΕΡΙΟΥΣΙΑΣ ΤΟΥ ΠΑΝΕΠΙΣΤΗΜΙΟΥ ΜΑΚΕΔΟΝΙΑΣ (in Greek)

[Επιλογή 3]: ΒΑΣΙΚΕΣ ΑΡΧΕΣ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΩΝ ΜΑΘΗΜΑΤΙΚΩΝ, ΧΑΛΙΔΙΑΣ ΝΙΚΟΛΑΟΣ**, Κωδικός Βιβλίου στον Εύδοξο: 77114183**, Έκδοση: 2η/2018, Συγγραφείς: Χαλιδιάς Νικόλαος, ISBN: 9789925563753, Τύπος: Σύγγραμμα, Διαθέτης (Εκδότης): BROKEN HILL PUBLISHERS LTD (in Greek)

[Επιλογή 4]: ΕΙΣΑΓΩΓΗ ΣΤΑ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΑ ΜΑΘΗΜΑΤΙΚΑ, ΧΑΛΙΔΙΑΣ ΝΙΚΟΛΑΟΣ**, Κωδικός Βιβλίου στον Εύδοξο: 55457960**, Έκδοση: 1η/2016, Συγγραφείς: Χαλιδιάς Νικόλαος, ISBN: 978605780128, Τύπος: Σύγγραμμα, Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΙΔΙΩΤΙΚΗ ΚΕΦΛΑΙΟΥΧΙΚΗ ΕΤΑΙΡΕΙΑ (in Greek)

B) Lecture Notes

Σημειώσεις παραδόσεων: Παράγωγα Χρηματοοικονομικά προϊόντα (εισαγωγή στην στοχαστική χρηματοοικονομική ανάλυση), Μπούτσικας Μιχαήλ, Τμήμα Στατιστικής και Αναλογιστικής Επιστήμης, Πανεπιστήμιο Πειραιά. (in Greek)

C) Additional Bibliography

1. An Elementary Introduction to Mathematical Finance: Options and other Topics, Ross, S., Cambridge University Press; 2nd edition , 2002.
2. Options, Futures and Other Derivatives, Hull, J., 5th edition, Prentice Hall, 2003.

3. The Mathematics of Financial Derivatives, Willmott, P., Howison, S., Dewynne, J., Cambridge University Press. .1997.
4. An Introduction to the Mathematics of Financial Derivatives, Neftci, S. N., Academic Press, 2000.