

230320 - EFPEI - Financial Engineering for Economic Planning of Investments

Coordinating unit:	230 - ETSETB - Barcelona School of Telecommunications Engineering		
Teaching unit:	744 - ENTEL - Department of Network Engineering		
Academic year:	2019		
Degree:	BACHELOR'S DEGREE IN TELECOMMUNICATIONS SCIENCE AND TECHNOLOGY (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN ELECTRONIC SYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2010). (Teaching unit Optional) BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Teaching unit Optional)		
ECTS credits:	2	Teaching languages:	Spanish

Teaching staff

Coordinator:	Jose Luis Melús Moreno
Others:	Jose Luis Melús Moreno

Prior skills

Basic calculus (integrals, derivatives, partial derivatives, Taylor expansion, etc.), Linear Algebra (Matrices and operations) and probability theory (mean, variance, normal random variables, Poisson, etc.)

Learning objectives of the subject

Economic planning of an investment is not simple or easy sometimes. The economic constraints of enterprises to tackle this task requires the use of financial tools to evaluate, through appropriate methods the characteristics and timing of investment to make. This seminar introduces the essential foundations of financial engineering in the economic planning of network investments and provides the basic mathematical tools to address these challenges. Attendance at this seminar can be very attractive, since not only the basics of financial engineering but also the way they treat are introduced, reviewing math skills already acquired.

Study load

Total learning time: 50h	Hours large group:	20h	40.00%
	Self study:	30h	60.00%

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Content

1- Introduction to the seminar	Learning time: 2h Theory classes: 2h
<p>Description:</p> <ul style="list-style-type: none"> 1.1. Main objectives of the seminar 1.2. Basics of financial engineering (interest rate, bonds, futures contracts, options on assets, etc.) 1.3. Application exercises 	
2- Mathematics in financial engineering. Review	Learning time: 4h Theory classes: 4h
<p>Description:</p> <ul style="list-style-type: none"> 2.1. Reviewing calculus (integration, derivation, Taylor developments, etc) 2.2. Probability review 2.3. Linear algebra review 2.4. Application exercises 	
3- Interest rate and bonds	Learning time: 2h Theory classes: 2h
<p>Description:</p> <ul style="list-style-type: none"> 3.1. Compound Interest 3.2. Bond yields 3.3. Application exercises 	
4- Forward and futures prices	Learning time: 2h Theory classes: 2h
<p>Description:</p> <ul style="list-style-type: none"> 4.1. Trading strategies 4.2. Determination of forward and futures prices 4.3. Application exercises 	

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5- Pricing financial derivatives. Pricing an option	Learning time: 8h Theory classes: 8h
<p>Description:</p> <ul style="list-style-type: none"> 5.1. Trading strategies involving options 5.2. European and American options 5.3. Methods to price options. Methods: <ul style="list-style-type: none"> 5.3.1. Binomial trees 5.3.2. Cox Rubinstein formula 5.3.3. Black-Scholes-Merton. Implied volatility 5.3.4. Monte Carlo simulation 5.4. Application exercises 	
6- Efficient Portfolios. Risk management. Markowitz's portfolios	Learning time: 2h Theory classes: 2h
<p>Description:</p> <ul style="list-style-type: none"> 6.1. Maximum expected value of the return on a portfolio 6.2. Efficient Portfolios. Maximum expected return and minimum variance 6.3. Application exercises 	

Bibliography

Basic:

Wilmott, Paul. Paul Wilmott introduces quantitative finance [on line]. 2nd ed. Wiley, 2007 [Consultation: 20/07/2015]. Available on: <<http://site.ebrary.com/lib/upcatalunya/docDetail.action?docID=10297867>>. ISBN 9780470319581.

Neftci, Salih N.; Hirt, Ali. An Introduction to the mathematics of financial derivatives. 3rd ed. San Diego [etc.]: Academic Press, 2014. ISBN 9780123846822.

Capinski, Marek, Zastawniak, Tomasz. Mathematics for finance : an introduction to financial engineering [on line]. 2nd ed. London ; New York: Springer, 2003 [Consultation: 20/07/2015]. Available on: <<http://link.springer.com/book/10.1007/b97511>>.

Hull, John. Options, futures and other derivatives. 9th ed. Harlow [etc.]: Pearson, 2015. ISBN 9780133456318.

Stefanica, Dan. A primer for the Mathematics of Financial Engineering. 2nd ed. New York: FE Press, 2011. ISBN 9780979757624.