

Syllabus: Financial mathematics (AQM1042)

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Course:	AQM1042 – Financial mathematics
Assessment/ Examination:	Exam – 60 minutes
Workload:	2 ECTS Credits, 2 SWS in one term (30 Contact hours)
Information and further material:	Material for the lecture is provided on the elearning-platform. Please search for „financial mathematics“ or „Wüst“ and pay attention to the term.
Prerequisites:	School knowledge in exponential and logarithmic functions
Validity Period:	Starting from winter term 2016/2017
Instructor:	Prof. Dr. Kirsten Wüst Office: W2.3.25 Office hours: See LSF Tel.: +49 7231 28 6375 Fax: +49 7231 28 6070 e-mail: kirsten.wuest@hs-pforzheim.de
Time schedule:	See LSF

Overview:

The lecture starts out with an introduction into the mathematical foundations necessary for the application of financial-mathematical methods. For that matter, exponential and logarithmic calculations as well as the handling of sums, series and sequences will be practiced. The core of the lecture is formed by the classical methods of financial mathematics, i.e. the computation of interest, capital budgeting, and pension and amortization calculations. Here, a special focus will be put on the practical application in one's private life, as well as in a company's normal routine. In the prospects, there will be an introduction and a discussion concerning the functionality and the handling of derivatives; in the lecture the chosen examples will be taken from interest derivatives. Students will learn estimating not only the risks of derivatives, but also the opportunities, and know about their capabilities concerning the protection of underlying transactions.

Learning objectives:

The students...

1. know the classical financial products.
2. can critically evaluate different offers of financial investments and the borrowing of money.
3. know the functionality and area of application of modern financial instruments (especially of interest derivatives), as well as their risks and opportunities.
4. are proficient in the mathematical foundations necessary for the analysis of the offers listed under (2.).

Contribution to the Learning Goals of Hochschule Pforzheim

Goal	Contribution
1 Know-How	<ul style="list-style-type: none"> - introduction into fundamental financial-mathematical methods (cash method) - evaluation of investments using the present value method - calculation of the current and future value of annuities - calculation of amortisation tables - basic knowledge about derivatives
2.1 use of information technologies	Use of MS-Excel for the calculation of interests and investments, as well as for the compilation of funding and amortisation tables
3 critical thinking	Critical evaluation of offers made by financial service providers (e.g. pension plans, loans, derivatives)
4 ethical awareness	Evaluation of a 'fair' offer, i.e. a market-driven one, and by that the ability to identify offers that are not in line with the market Sensitisation to different strategies in the handling of derivatives
5 communication	-
6 teamwork	-

Preliminary time table:

Session (90 Min.)	Subject
1	Overview, powers, quadratic equations
2	Logarithmic functions, sums
3	Sums, sequences
4	Series
5	Computation of interest
6	Interest days methods
7	Computation of interest (mixed yield, continuous compounding)
8	Equivalence of series of payments, investments
9	Investments
10	Annuities
11	Annuities
12	Amortisation
13	Interest rate financial instruments
14	Derivatives (interest derivatives)
15	Preparation for the exam

Teaching and Learning Approach

The concept of the course is that of a “classical lecture” which is “loosened up” by examples, exercises, discussions and partner interviews. In the lecture the classical tools for analysing questions from the field of financial mathematics is provided. The focus of the lecture is on the practical implementation of financial mathematical methods in practice and on their interpretation. Especially it is intended to promote abstract thinking and model building techniques.

In addition to the lecture we offer a tutorial in which students can work on exercises on their own. The tutorials are held by students from higher terms. The exercises for the tutorials are provided on the elearning platform.

Literature

- Wüst, Kirsten (2006): Finanzmathematik – Vom klassischen Sparbuch zum modernen Zinsderivat, Gabler Verlag, Wiesbaden.
- Martin, Tobias (2003): Finanzmathematik, Fachbuchverlag Leipzig.
- Kobelt, H., Schulte, P. (1999): Finanzmathematik, Verlag Neue Wirtschaftsbriefe (nwb)
- Beike, R., Barckow, A. (1998): Risk-Management mit Finanzderivaten: Studienbuch mit Aufgaben. 2. Aufl., Oldenbourg Verlag.
- Müller-Möhl, E. (1999): Optionen und Futures. 4. Aufl., Schäfer-Poeschel Verlag, Stuttgart.

Student responsibilities and class behaviour

- Effort and endeavour are crucial for studying. To read and study with the help of literature has to be self-evident for a Pforzheim University graduate. You find further literature sources in the mentioned textbook.

- In the course itself I expect interest for the topic, mutual respect and confidence, fairness, punctuality, continuity, engagement and willingness to perform.
- Please be fair to others. This implies that you are punctual for class, that you do not leave earlier and that other topics not relevant for the course are dealt with in the break (e.g. telephone calls, send SMS). Your mobile phone is off.
- Please always bring the relevant course material.
- I expect that each student takes part in class and that the subject matter is being prepared and reworked. The complexity of the topic demands a continuous “keeping at it”.
- It is self-evident and favoured that content relevant questions can be asked in each class. This is useful for you to see the comprehension progress and for the professor to estimate the knowledge level of students, so that specific topics can be more emphasised or be taught slower.
- Please ask questions directly during class or in the following lecture. In case you cannot do this or do not want to do it, please contact me after class.
- It would be ideal that self-studying (preparing work and rework, emphasise according to interests and focus of study) be amended by a learning group.
- I welcome helpful suggestions and constructive criticism as well as comments that support the understanding and learning progress.

My teaching philosophy

I would like to contribute to a successful learning progress and to an understanding for the practical meaning of learning contents. Comprehension questions should be asked directly in class. Comments that are useful for a better learning progress are welcome. My target is that you pass the course successfully, however the main part of work is on your side. In case you have problems whatsoever with the course do not hesitate to contact me.

Grading/Examination

The course grade consists of a 60 minutes exam at the end of the term.

For the grading I use the following scale:

- `Very good` stands for an outstanding performance far above average.
- `Good` stands for a performance that is above average.
- `Satisfactory` is an average performance that shows weaknesses but still corresponds to the requirements.
- `Sufficient` stands for a below average performance with evident weaknesses.
- `Poor` stands for a non-acceptable performance that does not correspond to the requirements.