1. General Information

To sign up for all courses, tutorials and exams, you use www.campus.tum.de, also known as TUMonline.

At the top right corner, you can change the language to English if necessary. Within the list on the left side, you can select Mathematics (Mathematik) and then Courses (Lehrveranstaltungen). Now you see a list of all courses offered in the current year at our Department:
2. List of Courses

The following list is an overview of core and special modules. This list might be incomplete due to the changes in offers every year. Only the core modules are offered every year, either in the summer or in the winter term. All special modules might be offered every year as well, but it is also possible that some are offered irregularly, every two years or it was an on time offer only (see 3.). The regular workload per term is 30 ECTS (Credits).

The following classification is not mandatory, but just to be understood as an overview (orientated at the classification from the M.Sc. Mathematics). In general, the meaning of the alphanumerical ID for each course is as follows:

- **MA** Course offered by the Mathematics department
- 1xxx-2xxx Basic and Fundamental Courses
- 3xxx-4xxx Advanced Courses
- 5xxx Specialized Courses (mainly offered irregularly)

Courses with ID 1xxx-2xxx are mostly Bachelor Modules and hence offered in German. The other modules are Master level where the language of instruction is mostly English.

**Analysis**

**Core Modules**
- MA3001 Functional Analysis
- MA3005 Partial Differential Equations
- MA3081 Dynamical Systems
- MA4064 Fourier Analysis (every 2. year)

**Special Modules**
- MA5051 Topics in Mathematical Data Analysis

**Algebra, Geometry and Discrete Mathematics**

**Core Modules**
- MA3101 Computer Algebra (every 2. year)
- MA3203 Projective Geometry 1
- MA3205 Differential Geometry
- MA3502 Discrete Optimization
- MA4502 Combinatorial Optimization

**Special Modules**
- MA2504 Fundamentals of Convex Optimization
- MA3241 Topology
- MA4211 Foundations of Geometry
- MA4512 Case Studies Discrete Optimization
- MA5101 Elementary Number Theory
- MA5120 Algebra 2
- MA5215 Discrete Geometry: Lattice Polytopes
Probability Theory, Statistics and Financial Mathematics

Core Modules
- MA2409 Probability Theory
- MA3402 Computational Statistics
- MA3403 Generalized Linear Models
- MA3411 Time Series Analysis
- MA3701 Discrete Time Finance
- MA3702 Continuous Time Finance
- MA4405 Stochastic Analysis

Special Modules
- MA3442 Actuarial Risk Theory
- MA3451 Life Insurance
- MA3452 Actuarial Mathematics for Pensions
- MA3453 Health Insurance
- MA3454 Non-Life Insurance
- MA3703 Fixed Income Markets
- MA4401 Applied Regression
- MA4408 Markov Processes
- MA4406 Probability on Graphs
- MA4472 Multivariate Statistics
- MA4706 Portfolio Analysis
- MA4801 Mathematical Foundations of Machine Learning
- MA5415 Quantitative Risk Management
- MA5417 Large Deviations
- MA5717 Computational Finance

Numerics, Scientific Computing and Nonlinear Optimization

Core Modules
- MA3303 Numerical Methods for Partial Differential Equations
- MA3503 Nonlinear Optimization: Advanced
- MA3601 Mathematical Models in Biology
- MA3602 Advanced Mathematical Biology
- MA4503 Modern Methods in Nonlinear Optimization

Special Modules
- MA4303 Advanced Finite Element Methods
- MA4304 Computational Plasma Physics
- MA4512 Case Studies Nonlinear Optimization
- MA5324 Meshfree Methods
- MA5329 Geometric Numerical Integration of Ordinary Differential Equations
- MA5607 Topics in Computational Biology
3. How to get specific information about several courses

If you want to have specific information about a course, you click again *Mathematics* at the left side, and then on *Module Catalogue*. There you can search with the course ID or the name.

**Module handbook**

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<thead>
<tr>
<th>Name</th>
<th>ID</th>
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<tbody>
<tr>
<td>Generalized Model Solutions for Physical Systems, Modeled by PDE's and Their Linear Stability</td>
<td>MA5342</td>
<td>TUMAFMA</td>
</tr>
<tr>
<td>Mathematical Theories in other Disciplines from other Universities</td>
<td>MA8301</td>
<td>TUMAFMA</td>
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<tr>
<td>Abstract Harmonic Analysis</td>
<td>MA5065</td>
<td>TUMAFMA</td>
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<tr>
<td>Actuarial Mathematics for Pensions</td>
<td>MA3452</td>
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</tr>
<tr>
<td>Actuarial Risk Theory</td>
<td>MA3442</td>
<td>TUMAFMA</td>
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To get detailed information for a course, you simply click on its name.

Here you see in the Comment that e.g. the course “Actuarial Mathematics for Pensions” is only offered every second year (“alle 2 Jahre”), not every year. If you scroll down a bit, you get the information about the workload and in which term this course is offered, what is the language of instruction, a short course description as well as the recommended prerequisites:
Study and examination performance

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<th>Description of Achievement and Assessment Methods</th>
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<td>Klusst. acknowledged by the German Society of Actuaries (DAV)</td>
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**Type of Assessment (Please do not fill in):** written  
**Duration of Assessment (Please do not fill in):** 60  
- Homework: N  
- Term Paper: N  
- Oral Presentation: N  
- Conversation: N  
- Exam retake at the end of semester: N

### Description

**Prerequisites (recommended):** MA1401 Introduction to Probability, MA2402 Basic Statistics  
**Intended Learning Outcomes:** After successful completion of the module the students are able to understand and apply actuarial methods to value pension liabilities - both under German and international accepted accounting principles.

**Content:** In this course students will learn the basics of occupational pension schemes and the actuarial methods required to value pension liabilities. In particular the following topics will be covered:

1. Typical examples for occupational pension schemes (defined benefit plans, defined contribution plans, cash balance plans).  
2. Methods to derive mortality and disability probabilities.  
3. How to calculate the present value of pension liabilities.  

Please be aware that only because the title and the information might be in English, this does NOT imply that the course is offered in English. Binding is the language (of instruction) as written in the *General Data (module handbook)* section.