### Syllabus

#### Course description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Advanced Quantitative Methods</th>
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<tbody>
<tr>
<td>Course code</td>
<td>29054</td>
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<tr>
<td>Scientific sector</td>
<td>SECS/S-06</td>
</tr>
<tr>
<td>Degree</td>
<td>PhD in Economics and Finance</td>
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<tr>
<td>Semester and academic year</td>
<td>1/2</td>
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<tr>
<td>Year</td>
<td>1st</td>
</tr>
<tr>
<td>Credits</td>
<td>2</td>
</tr>
<tr>
<td>Modular</td>
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</tr>
<tr>
<td>Total lecturing hours</td>
<td>14</td>
</tr>
<tr>
<td>Total office hours</td>
<td>Not foreseen</td>
</tr>
<tr>
<td>Total exercise hours</td>
<td>Not foreseen</td>
</tr>
<tr>
<td>Attendance</td>
<td>required</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>-</td>
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<td>Course page</td>
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<td>Specific educational objectives</td>
<td>The first part of the course is focused on the price or value of claims to uncertain payments. We introduce the concept of a stochastic discount factor (or alternatively an equivalent martingale measure) in a simple Lucas economy. The model framework provides an economic intuition risk-neutral pricing. The second part of the course refers to typical educational activities and belongs to the scientific area of financial risk management and regulation.</td>
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**Lecturer**

Prof. Dr. rer. nat. habil. Andreas Hamel, Email: Andreas.Hamel@unibz.it, Phone: 0474 013651 Campus, Bruneck- Brunico, Office 1.11

Prof. Dr. Alex Weissensteiner, Email: alex.weissensteiner@unibz.it, Phone: 0471 013496, Campus Bozen - Bolzano, Office E2.06

**Scientific sector of the lecturer**

SECS/S-06

**Teaching language**

English

**Office hours**

Not foreseen

**Lecturing assistant**

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**List of topics covered**

- Lucas Economy (one-period model)
- Stochastic discount factor (SDF)
- Risk-neutral pricing
- General equilibrium models (multi-period models)
- Risk as a subjective concept, attitude towards risk,
decisions under risk,

- Axiomatic approach to risk quantification, risk measures and acceptance sets
- Dual representation of convex risk measure
- Applications: from value-at-risk to average value-at-risk and the Basel accord

**Teaching format**  
Frontal lectures

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**Learning outcomes**

**Knowledge and Understanding:** SDF, risk-neutral pricing, getting basic knowledge on modern risk quantification; developing an understanding of axiomatic approaches to risk management.

**Applying Knowledge and Understanding:** pricing uncertain claims, taking optimal inter-temporal consumption and investment decision, applying concepts from probability theory to risk management and financial regulation in practice (Basel accord).

**Making Judgements:** ability to understand decision making processes under risk.

**Communication skills:** develop basic abilities for communication on quantitative risk management.

**Learning skills:** learn how to design and formulate an appropriate axiomatic approach for decision making problems.

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**Assessment**  
Quiz at the end of each of the two parts.

**Assessment language**  
English

**Evaluation criteria and criteria for awarding marks**  
Active course participation and successful completion of the quizzes result in a pass/fail.

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**Required readings**


**Supplementary readings**  
Will be announced during the course.