University of St.Gallen

Course and Examination Fact Sheet: Spring Semester 2025

8,194: Derivatives Modeling in Python

ECTS credits: 4

Overview examination/s
(binding regulations see below)
decentral - Written work, Digital, Group work group grade (30%)
Examination time: Term time
decentral - Written examination, Digital, Individual work individual grade (70%, 90 mins.)
Examination time: Term time

Attached courses
Timetable -- Language -- Lecturer
8,194,1.00 Derivatives Modeling in Python -- English -- Mörke Mathis

Course information

Course prerequisites

As a prerequisite, the MBF-courses "Financial Markets" and "Quantitative Methods" must have been completed. The MBF-course "Derivatives" must be attended in parallel to this course. No previous knowledge of Python is necessary.

Learning objectives
- Students acquire a thorough understanding of how derivative models and pricing algorithms are implemented in practice.
- Students learn how to translate mathematical formulas and algorithms into readily runnable computer code using Python.

Course content

The primary objective of this course is to give students an introduction into how derivative models and pricing algorithms are implemented in practice and to demonstrate industry applications of option pricing theory. Students will also learn how to translate mathematical formulas and algorithms into readily runnable computer code, a qualification that is not limited to derivative theory but can be applied to a wide range of financial modeling applications. The course is designed as a computer workshop. Guided by the instructor, students will solve specific problems related to derivative applications by writing their own computer code. Python will be employed throughout the whole course. Python is easily accessible and it is widely used in practice. It also bears close resemblance to other programming languages which aids the transition to other programming environments. Furthermore, being able to handle a programming language and thereby being able to automate financial applications is a qualification that is highly sought after in the finance industry and very beneficial when applying for a job. This course implements the models introduced in the course "Derivatives (8,152)" using Python. This helps students to gain a deeper understanding of the topic and its applications. For further information, please refer to the **course syllabus** (available on Canvas).

Course structure and indications of the learning and teaching design

The course is structured as follows:

1. Introduction to Python
2. Binomial Model
3. Black-Scholes and Greeks
4. Risk Management with Simulations
5. Exotic Options

6.   Model Calibration
7.   Parameter Estimation
8.   Implied Densities
9.   Volatility Derivatives
10. Tail Risk

Course literature

Required reading:

Handouts and additional readings will be provided on Canvas.

Additional course information

Independent Studies

The exercises are to be solved individually and will be discussed in the respective modules.

Information

Information and announcements regarding the course will be made available on Canvas.

Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination modalities

Examination type	Written work
Responsible for organisation	decentral
Examination form	Written work
Examination mode	Digital
Time of examination	Term time
Examination execution	Asynchronous
Examination location	On Campus
Grading type	Group work group grade
Weighting	30%
Duration	--

Examination languages
Question language: English
Answer language: English

Remark
Take-home Case Study

Examination-aid rule
Free aids provision

Basically, students are free to choose aids. Any restrictions are defined by the faculty members in charge of the examination under supplementary aids.

Supplementary aids

No LLM-based text-generating software, both offline or online

University of St.Gallen

2. Examination sub part (2/2)

Examination modalities

Examination type	Written examination
Responsible for organisation	decentral
Examination form	Written exam
Examination mode	Digital
Time of examination	Term time
Examination execution	Synchronous
Examination location	On Campus
Grading type	Individual work individual grade
Weighting	70%
Duration	90 mins.

Examination languages
Question language: English
Answer language: English

Remark
Computer-based Final Exam

Examination-aid rule
Open Book

Students are free to choose aids, apart from the following restrictions:

- pocket calculator models which are not part of the Texas Instruments TI-30 series, as well as any programmable electronic devices that are capable of communication such as electronic dictionaries, notebooks, tablets, smartphones, headsets, additional screens, etc. are not admissible;

- there is an option for faculty members to explicitly define exceptions under supplementary aids.

Procuring any aids, as well as ensuring their working order, is the exclusive responsibility of students.

Supplementary aids

Python and internet search are admissable. No LLM-based text-generating software, both offline and online.

Examination content

For further information on the exam details, please refer to the **course syllabus** (available on Canvas).

Examination relevant literature

For further information on the exam details, please refer to the **course syllabus** (available on Canvas).

University of St.Gallen

Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 13 (Monday, 25 March 2025) are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 23 January 2025);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 17 March 2025);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 14 (Monday, 31 March 2025);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before ending with de-registration period in CW 15 (Monday, 07 April 2025).