



Course and Examination Fact Sheet: Autumn Semester 2020

3,584: Mathematical Tools for Data Science

ECTS credits: 3

Overview examination/s

(binding regulations see below)

Central - Written examination (60%, 60 mins.)

Examination time: inter-term break

Decentral - Group examination paper (all given the same grades) (40%)

Examination time: term time

Attached courses

Timetable -- Language -- Lecturer

[3,584,1.00 Mathematical Tools for Data Science](#) -- Englisch -- [Horlemann Anna-Lena](#)

Course information

Course prerequisites

Basic mathematical knowledge from the assessment level.

Learning objectives

At the end of the course the participants will be able to understand abstract and higher mathematics, and apply well-grounded logic to general reasoning and scientific proofs.

Course content

The idea of this course is to give a better understanding of the abstract mathematics that underlie many applied problems and procedures. For this, we will go through the basic mathematics of proving theorems, set theory, linear algebra, probability and measure theory, while illustrating the need for those with some applied examples. The participants will learn how to think, read and write like a mathematician, which will make them understand mathematically or technically advanced books and papers. This is especially helpful for those who aim at a more technically inclined master thesis/program.

Topics covered in this course are:

- Basic logic
- Proof by contradiction, proof by induction
- Set theory: operations on sets, countability, open sets, etc.
- Linear algebra
- Measures on sets, sigma algebras
- Probability theory based on measures

Course structure

There will be one class of two hours each week. The weekly homework exercises will complement the content learned in class.

Course literature

Lecture notes. Further literature recommendations will be given in class.

Additional course information

In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in AS2020, the course



information listed above will be changed as follows:

- The course is conducted online via the platform Zoom;
- The recordings of the course are available for 30 days;
- The lecturer informs via StudyNet on the changed implementation modalities of the course.

The examination information listed below would be changed as follows:

There are no changes necessary to the examination information.

Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination time and form

Central - Written examination (60%, 60 mins.)

Examination time: inter-term break

Remark

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Examination-aid rule

Extended Closed Book

The use of aids is limited; any additional aids permitted are exhaustively listed under "Supplementary aids". Basically, the following is applicable:

- At such examinations, all the pocket calculators of the Texas Instruments TI-30 series and mono- or bilingual dictionaries (no subject-specific dictionaries) without hand-written notes are admissible. Any other pocket calculator models and any electronic dictionaries are inadmissible.
- In addition, any type of communication, as well as any electronic devices that can be programmed and are capable of communication such as notebooks, tablets, mobile telephones and others, are inadmissible.
- Students are themselves responsible for the procurement of examination aids.

Supplementary aids

1 sheet of A4 paper with arbitrary content (both sides may be used, either hand- or computer-written)

Examination languages

Question language: English

Answer language: English

2. Examination sub part (2/2)

Examination time and form

Decentral - Group examination paper (all given the same grades) (40%)

Examination time: term time

Remark

Homework exercises

Examination-aid rule

Term papers

Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship which is a published template in StudentWeb.



The documentation of sources (quotations, bibliography) has to be done throughout and consistently in accordance with the chosen citation standard such as APA or MLA.

For papers in law, the legal standard is recommended (by way of example, cf. FORSTMOSER, P., OGOREK R. et SCHINDLER B., Juristisches Arbeiten: Eine Anleitung für Studierende, newest edition respectively, or according to the recommendations of the Law School).

The indications of the sources of information taken over verbatim or in paraphrase (quotations) must be integrated into texts in accordance with the precepts of the applicable quotation standard, while informative and bibliographical notes must be added as footnotes (recommendations and standards can be found, for example, in METZGER, C., Lern- und Arbeitsstrategien, newest edition respectively).

For any work written at the HSG, the indication of the page numbers is mandatory independent of the chosen citation standard. Where there are no page numbers in sources, precise references must be provided in a different way: titles of chapters or sections, section numbers, acts, scenes, verses, etc.

Supplementary aids

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Examination languages

Question language: English

Answer language: English

Examination content

There will be weekly homework exercises that may be solved in groups of up to three participants.

In the final exam you will have to solve exercises similar to the homework exercises. Possible topics will be:

- Propositional and predicate logic
- Proof by contradiction, proof by contrapositive, proof by induction
- Set theory: operations on sets, countability, open sets, etc.
- Vector spaces, metric spaces, sigma algebras
- Measures
- Probability theory based on measures

Examination relevant literature

The lecture notes and homework solutions should give you all the information needed to prepare for the exam. Advanced mathematics books can be used for additional information.



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 (CW51) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 42 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 34 (Thursday, 20 August 2020);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 12 October 2020);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 42 (Monday, 12 October 2020);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 44 (Thursday, 29 October 2020).