University of St.Gallen

Course and Examination Fact Sheet: Autumn Semester 2021

5,255: Mathematics for Economists

ECTS credits: 6

Overview examination/s

(binding regulations see below)
Decentral - Written examination (with defined exam duration) (100%, 120 mins.)
Examination time: term time

Attached courses

Timetable -- Language -- Lecturer
5,255,1.00 Mathematics for Economists -- Englisch -- Elsayed Mahmoud Ola

Course information

Course prerequisites

Assessment level Mathematics A and Mathematics B.

Learning objectives

- Students will learn new mathematical concepts.
- Students gain a clear understanding on how these concepts are applied in economics.

Course content

The knowledge gained in the Mathematics Assessment Level courses will be deepened with a particular view on economic applications. This course is especially useful for students studying Economics and for those intending to continue with a Master in Economics (MEcon) or the Master in Quantitative Economics and Finance (MiQE/F). New mathematical concepts will be introduced and examples of their economic applications will be illustrated.

The course covers the following topics:

- Topics in Mathematical Analysis
- Dynamic Systems and Stability
- Economic Optimization
- Probability Theory and Stochastic Processes

Course structure and indications of the learning and teaching design

The course consists of weekly lectures and exercise sessions.

Course literature

Mahmoud, O. (2021): Mathematics for Economists, Lecture notes on StudyNet (Canvas)

Selected chapters from *De Giorgi, E. (2019): Mathematics B, Sixth Edition.*

References, including academic journal articles, on relevant topics made available on StudyNet (Canvas).

Additional course information

In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in fall term 21, the course information listed above will be changed as follows:

- The course is conducted online via the platform Zoom;
- all lectures will take place virtually live during the scheduled lecture dates and times;
- 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:

The final examination in that case will be a decentralized oral examination taking place virtually and accounting for 100% of the grade, thus replacing the written examination; the oral examination is conducted online and is being recorded. Further information are communicated via StudyNet.

Examination information

Examination sub part/s

1. Examination sub part (1/1)

Examination time and form
Decentral - Written examination (with defined exam duration) (100%, 120 mins.)
Examination time: term time

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
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Examination languages
Question language: English
Answer language: English

Examination content

Topics

Part I: Topics in Mathematical Analysis and Economic Optimization.

- Taylor polynomials in one and two variables, Taylor's Theorem
- Linear Algebra Review
- Quadratic forms and definite matrices
- Complex numbers
- Method of Lagrange multipliers for optimization problems with several constraints

- Implicit Function Theorem
- Envelope Theorem
- Nonlinear optimization with inequality constraints; Kuhn-Tucker Theorem
- Convex optimization

Part II:Dynamic Systems and Stability.

- Difference equations
- Differential equations
- Systems of differential equations and stability

Part III: Probability Theory

- Foundations of probabilities
- Conditional probability and Bayes Theorem
- Random variables, conditional expectations, moment generating function, characteristic function
- Convergence, laws of large numbers, central limit theorem
- Stochastic processes: probabilistic characterization of a stochastic process, Markov processes, fair games and martingales, Brownian motion

Examination relevant literature

Mahmoud, O. (2021). Mathematics for Economists, Lecture notes on StudyNet (Canvas)

De Giorgi, E. (2019). Mathematics A, Sixth Edition (Chapter 5-Section 2, Chapter 10-Section 6)

De Giorgi, E. (2019). Mathematics B, Sixth Edition (Chapters 12,19,20,21)

References, including academic journal articles, on relevant topics as advertised on StudyNet (Canvas).

All materials will be made available on StudyNet (Canvas) before the final exam.

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Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are is 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, 26 August 2021);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 18 October 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 42 (Monday, 18 October 2021);

Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 45 (Monday, 8 November 2021).