



## Course and Examination Fact Sheet: Autumn Semester 2023

### 5,255: Mathematics for Economists

ECTS credits: 6

#### Overview examination/s

(binding regulations see below)

decentral - Analog written examination, Analog, Individual work individual grade (100%, 120 Min.)

Examination time: Term time

#### Attached courses

Timetable -- Language -- Lecturer

[5,255,1.00 Mathematics for Economists](#) -- English -- [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. (2023): 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

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## Examination information

### Examination sub part/s

#### 1. Examination sub part (1/1)

##### Examination modalities

Examination type	Analog written examination
Responsible for organisation	decentral
Examination form	Written exam
Examination mode	Analog
Time of examination	Term time
Examination execution	Synchronous
Examination location	On Campus
Grading type	Individual work individual grade
Weighting	100%
Duration	120 Min.

##### Examination languages

Question language: English  
Answer language: English

##### Remark

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##### Examination-aid rule

Closed Book

The use of aids is prohibited as a matter of principle, with the exception of pocket calculator models of the Texas Instruments TI-30 series and, in case of non-language exams, bilingual dictionaries without any handwritten notes. Any other aids that are admissible must be explicitly listed by faculty members in the paragraph entitled "Supplementary aids" of the course and examination fact sheet; this list is exhaustive.

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

##### Supplementary aids

No supplementary aids

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## 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.

- 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. (2022). 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.



## 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, 24 August 2023);
- Examination information (supplementary aids, examination contents, examination literature) for decentralised examinations: in CW 42 (Monday, 16 October 2023);
- Examination information (supplementary aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 45 (Monday, 06 November 2023);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the de-registration period in CW 45 (Monday, 06 November 2023).