

MM1005-Mathematics for Economic and Statistical Analysis, 7.5 hp

Reading List

Essential Mathematics for Economic Analysis; Sydsæter & Hammond, 6th ed., Pearson 2021

Note: This 6th edition differs substantially with respect to the previous one, but the mathematical content is essentially the same, so you can use that instead. Nevertheless, the pages below refer to those in the new edition.

Course content

The course covers elementary functions, derivatives, maximum and minimum problems, Taylor's formula and Taylor series, integrals, functions of several variables, optimisation problems with and without constraints, matrices and determinants.

Learning outcomes

It is expected that the student after taking the course will be able to:

- use basic methods in analysis in one or several variables to solve mathematical and applied problems in e.g geometry and economics
- solve elementary problems on matrices, vectors and determinants.

Teaching

Teaching consists of 15 sessions, each consisting of Lectures (90 minutes) and Tutorials (90 minutes). The lectures will mainly deal with the basic theory, while the Tutorials are entirely devoted to practical problem solving. The course will be taught in English.

Exact time and room vary; see the full schedule for details.

Examination

The course ends on 30/09/2025 with a written exam. The final exam may consist of six or seven exercises. At least 50% of the points in the written exam will guarantee grade E, 60% for D, 70% for C, 80% for B and 90% for A.

To be able to sit the exam/re-exam, it is mandatory to register previously in Ladok. This has to be done at least 15 working days previous to the exam date.

Schedule

The full schedule can be found in TimeEdit

Office hours

By appointment: email s.rodriguez-lopez@math.su.se with "MM1005" (without quote marks) in the subject line.

Page of the course

Please log-in in the course-page of the course and familiarise yourself with the VLE:
<https://kurser.math.su.se/course/view.php?id=1663>

Stockholm, August 2025.

Salvador Rodríguez-López

Preliminary Tutorial plan

(Try to prepare as many problems as possible before each session)

Lecture 1		§7.4: 2-6	p. 251-252
General introduction + background		§7.5: 1, 2, 3, 5	p. 255-256
4.4 Linear Functions		Lecture 5	
4.6 Quadratic Functions		7.6 Taylor's Formula	
4.7 Polynomials		7.8 Continuity	
		7.9 More on Limits	
§4.4: 5, 6, 7	p. 115	7.12 L'Hôpital's Rule	
§4.5: 3	p. 119		
§4.6: 3, 5, 7	p. 126	§7.6: 1, 3, 4 p 259	
§4.7: 2, 3, 4	p. 134	§7.8: 2, 3	p. 269-270
Lecture 2		§7.9: 1, 2	p. 277-278
4.8 Power Functions		§7.12: 1, 2, 3	p. 291
4.9 Exponential Functions		Lecture 6	
4.10 Logarithmic Functions		7.10 Intermediate Value Theorem. Newton's Method	
6.1 Slopes of Curves		9.1 Extreme Points	
6.2 Tangents and Derivatives		9.2 Simple Tests for Extreme Points	
6.3 Increasing and Decreasing Functions		9.4 The Extreme Value Theorem	
§4.9: 1, 2, 4, 5, 6	p. 140-141	§7.10: 1,4	p. 283
§4.10: 1, 2, 5, 7	p. 146-147	§9.1: 1	p. 324
§6.1 1, 2 p	p. 182-183	§9.2: 1, 2, 5, 7	p. 327-328
§6.2: 1, 4, 5, 6, 7, 8	p. 188	§9.4: 1, 2	p. 339
Lecture 3		Lecture 7	
6.5 A brief introduction to Limits		9.6 Local Extreme Points	
6.6 Simple Rules for Differentiation		8.6 Inflection Points	
6.7 Sums, Products, and Quotients		10.1 Indefinite Integrals	
6.8 Chain Rule		10.2 Area and Definite Integrals	
6.9 Higher-Order Derivatives		10.3 Properties of Definite Integrals	
§6.5: 1, 4, 5, 6 p	p. 200-201	10.5 Integration by Parts	
§6.6: 1-4 p	p. 204-205,	§9.6: 1, 3, 5, 6	p. 351
§6.7: 2, 3, 7, 8 p	p. 211-212	§8.6: 1, 2, 3	p. 319
§6.8: 2, 3a,c, 6, 12	p. 217-218	§8.7: 2, 3	
§6.9: 2, 4, 5	p. 219	§10.1: 1a-c,e-g, 2, 3, 4, 11, 12	p. 361
Lecture 4		§10.2: 2, 5, 7, 8	p. 368
6.10 Exponential Functions		§10.3: 9a-c, 10	p. 372
6.11 Logarithmic Functions		§10.4: 2	p. 379
7.1 Implicit Differentiation		Lecture 8	
7.4 Linear Approximations		10.6 Integration by Substitution	
7.5 Polynomial Approximations		10.7 Improper integrals	
§6.10: 1, 2a-b, 6a-b	p. 223-224	11.4 Geometric Series	
§6.11 2a,c, 3b-c,e-h	p. 229	14.1 Functions of Two Variables	
§7.1: 1, 2, 3, 7a, 8	p. 239	14.2 Partial Derivatives (Two Variables)	

§10.6: 1, 2, 3, 4	p. 388-389	Lecture 12	
§10.7: 1	p. 395	12.1 Matrices and Vectors	
§10.4: 2, 3, 4, 5		12.2 System of linear equations	
§11.4: 2, 3, 4, 5	p. 413	12.3 Matrix Addition	
§14.1: 1, 3, 4, 6, 7	p. 564-565	12.4 Algebra of Vectors	
§14.2: 2, 3, 4, 5, 7	p. 571	12.5 Matrix Multiplication	
Lecture 9		§12.1: 2, 3	p. 450
14.3 Geometric Representation		§12.2: 1, 3, 4	p. 452
14.4 Surfaces and Distance		§12.3: 1, 2	p. 454
14.5 Functions of More Variables		§12.4: 1, 3	p. 457
14.9 Economic applications		§12.5: 1, 3, 4	p. 462
15.1 A Simple Chain Rule		Lecture 13	
§14.4: 2, 3, 4	p. 580	12.6 Rules for Matrix Multiplication	
§14.5: 1	p. 585	12.7 The Transpose	
§14.9: 2	p. 607	12.8 Gaussian Elimination	
§15.1: 1, 2, 3	p. 618	§12.7: 1,2	p. 472
Lecture 10		§12.8: 1, 2, 3, 4	p. 478-479
17.1 Two Variables: Necessary Conditions		Lecture 14	
17.2 Two Variables: Sufficient Conditions		13.1 Determinants of Order 2	
§17.1: 1,2, 4	p. 694	13.2 Determinants of Order 3	
§17.2: 4, 5	p. 699	13.4 Basic Rules for Determinants	
Lecture 11		13.6 The Inverse of a Matrix	
17.3 Local Extreme Points		§16.1: 1, 2, 5	p. 498
17.5 The Extreme Value Theorem		§16.2: 1, 2, 3, 4, 6	p. 504
18.1 The Lagrange Multiplier Method		§16.4: 2, 8	p. 513
§17.3: 1, 2	p. 704	§16.6: 1, 3	p. 523
§17.5: 2, 3, 4	p. 716	Lecture 15	
§18.1: 4, 5	p. 738	Revision	

Grading criteria — Betygskriterier

A	The student shows good ability to solve difficult problems on both core material and advanced topics of the course, and very good understanding in perspective of the mathematical concepts involved.	Studenten visar god förmåga att lösa svåra problem på både det centrala materialet och avancerade ämnen av kursen, och mycket god förståelse med helhetsbild av kursens matematiska begrepp.
B	The student shows good ability to solve most problems on core topics of the course and some problems on more advanced topics, and a solid understanding of the mathematical concepts involved, but the student does not fulfil the criteria for grade A.	Studenten visar god förmåga att lösa de flesta problem på kursens centrala material och några problem på mer avancerade ämnen, och en säker förståelse av kursens matematiska begrepp, men studenten uppfyller inte kraven för betyget A.
C	The student shows ability to solve most problems on core topics of the course, and understanding of core mathematical concepts. The student does not fulfil the criteria for higher grades.	Studenten visar förmåga att lösa de flesta problem på kursens centrala ämnen, och förståelse av kursens centrala matematiska begrepp. Studenten uppfyller inte kraven för högre betyg.
D	The student shows ability to solve simpler problems on core topics of the course, possibly with minor errors, and understanding of most core concepts. The student does not fulfil the criteria for higher grades.	Studenten visar förmåga att lösa enklare problem på kursens centrala ämnen, möjligtvis med smärre brister, och förståelse av de flesta centrala begrepp. Studenten uppfyller inte kraven för högre betyg.
E	The student shows ability to solve some simpler problems on core topics of the course, possibly with minor errors, and some understanding of most core concepts. The student does not fulfil the criteria for higher grades.	Studenten visar förmåga att lösa några enklare problem på kursens centrala ämnen, möjligtvis med smärre brister, och någon förståelse av de flesta centrala begrepp. Studenten uppfyller inte kraven för högre betyg.
F	The student does not fulfil the criteria for grades A–E.	Studenten uppfyller inte kraven för betyg A–E.