

UNIVERSITAS INDONESIA FACULTY OF ECONOMICS AND BUSINESS DEPARTMENT OF ECONOMICS

SYLLABUS ECEU600001 BASIC MATHEMATICS FOR BUSINESS AND ECONOMICS

Credit: 3 Odd Semester 2022/2023

A. Teaching Team

- 1. Nachrowi DJ Nachrowi
- 2. Ainul Huda
- 3. Amalia Anis
- 4. Ledi Trialdi
- 5. Dhaniel Ilyas/I Dewa Gede Karma Wisana
- 6. M. Shauqie Azar

B. Subject Description

Mathematics is one of the tools to comprehensively analyze economic and business problems. Mathematical approach allows the economic analysis using many variables and accurately predicts the change in magnitude and direction of such variables. The course covers the following topics: (i) essentials of logic and set theory; (ii) algebra and matrix to solve linear equation system problems; (iii) differential calculus to deal with optimization problem and conduct comparative-static analysis; and (iv) static optimization. All the concepts and their applications in economic and business will be covered in one semester.

C. Course Type

Compulsory of Faculty

D. Course Requirement

None

E. References

- Chiang, A.C. & Wainwright, K. (2005), *Fundamental Methods of Mathematical Economics*, 4th Edition, International Edition, McGraw-Hill. **[AC]**
- Sydsæter, K., Hammond P., Strøm, A., & Carvajal, A. (2016), *Essential Mathematics for Economic Analysis*, 5th Edition, Pearson Education Ltd. **[KS]**
- Chiang, A. C., K. Wainwright, Prof. Budi Frensidy, Mahyus Ekananda, and Telisa A. Falianty (2010), *Fundamental Methods of Mathematics for Business and Economics*, Indonesian Edition: Volume 1, Penerbit Salemba 4.
- Dowling, E.T. (2001), *Introduction to Mathematical Economics*, 3rd Edition, International Edition, McGraw-Hill.

F. Expected Learning Outcome

In accordance with the AACSB accreditation, the following Learning Goals (LG) and Learning Objectives (LO) are to be assessed:

- Learning Goal: BASIC KNOWLEDGE Students understand basic concepts of economics and business.
 Learning Objectives:
- Learning objectives: (1.4) Apply basic quantitative methods using the appropriate tools
 Traits: 1.4.1. Using relevant basic quantitative method
 - 1.4.2. Providing correct interpretation of the calculation result

G. Course Delivery

The course will be delivered in 14 weeks with 2.5 hours of class meeting per week, while tutorial class will be given 10 times for 2 hours in each session.

During the class session, there will be four main activities:

- (1) Review of previous week discussion and home assignment
- (2) Discussion of new topic/concept
- (3) Problem solving exercise
- (4) Wrap up discussion

H. Assessment

<u>Components</u>	<u>Percentage</u>
	<u>(%)</u>
Home Assignments	30
Mid term exam	35
Final Exam	<u>35</u>
Total	100

I. Attendance

Faculty of Economics and Business, Universitas Indonesia, and the program require a minimum attendance as eligibility requirement to take the final exam and pass the subject:

- 80% of lectures (maximum 3 absences)
- 70% of tutorial sessions (maximum 3 absences)

J. Class Time Table

Week	Topic & subtopics	Reference s	
1	Essentials of logic	CW (1) KS (1)	
1/9/21	 Mathematical proofs Mathematical induction 		
2	Algebra	CW (2)	
0./0./01	 The real numbers 	KS (2)	
8/9/21	- Rules of algebra	CW (2)	
5	- Set notation	KS(1)	
15/9/21	 Relationships between sets 	10 (1)	
10/ // 11	 Operations on sets 		
	 Laws of set operations 		
4 & 5	Relations and functions	CW (2)	
	 Types of function 	KS (4 – 5)	
22 &	 Solving equations 		
29/9/21	 Functions of one variable 		
697	 Properties of functions Linear models and matrix algebra 		
0 & /	- How to arrange a matrix system	KS (15 &	
6&	 Matrices and vectors 	16)	
13/10/21	 Matrix and vector operations 	10)	
10/10/11	 Identity matrices and null matrices 		
	 Transposes and inverses 		
	 Vector concept to non-singularity test 		
	 Non-singular matrix: conditions and tests 		
	 Concept of determinants 		
	 Finding the inverse matrix 		
	 From matrix inversion to Cramer's rule 		
MID-TERM EXAM: October 14 – 25, 2021			
8	Comparative Statics and Derivative	CW (6)	
	 The nature of comparative statics and derivative 	KS (6 & 7)	
27/10/21	 Rate of change, the concept of limit and the derivative 		
	 The derivative and the slope of a curve 		
	 Continuity and differentiability of a function 		
9	Rules of Differentiation and Their Use in Comparative Statics	CW (8 &	
	– Rules of differentiation: linear and polynomial function	10)	
3/11/21	 Rules of differentiation: exponential and logarithmic 	KS (6, 7, &	
	function	11)	
	 Derivative applications to the calculation of growth and 		
10011	elasticity	CW(7,9,0)	
10 & 11	- Partial differentiation	LWV [/ & Ŏ] KS (7 11 Ω	
10/11 &	 Total differentials and total derivatives 	12)	
17/11/21	 Derivatives of implicit functions 	14)	
,,	 Applications to comparative static analysis and partial 		
	elasticity		

12	Optimization without constraint (single variable case) and its applications	CW (9 & 10)	
24/11/21	 Optimum versus extremum values Convexity and concavity Relative maximum and minimum: interpretation of first and second derivatives Optimization without constraint (single variable case) using first-derivative test, second-derivative tests, and Nth derivative test Necessary versus sufficient condition Applications of optimization without constraint (single variable case) 	KS (8)	
13 1/12/21	 Optimization without constraint (more than one variable cases) and its applications The differential version of optimization conditions Optimization without constraint (more than one variable case) using first- and second-order condition (Hessian determinant) Applications of without constraint (more than one variable cases) 	CW (11) KS (13)	
14 8/12/21	 Optimization with equality constraints and its applications Effects of a constraint Finding stationary values using Lagrange Second-order conditions: Bordered Hessian and bordered Determinant Applications optimization with equality constraints 	CW (12) KS (14)	
FINAL-TERM EXAM: December 14 – 23, 2021			

K. Plagiarism

Students should maintain originality and respect intellectual property rights. Therefore, students should avoid conducting any act of plagiarism when doing written assignments (if any), which may take a form of short individual / group paper and / or summary.

The followings are acts of plagiarism:

- Copying paragraphs, sentences, a single sentence, or even a significant part of a sentence directly without enclosing them in quotation marks and appropriately footnoted;
- Using and / or developing other's ideas found in printed materials or film elsewhere without explicitly referencing them to the respective author or the source of the idea.

Plagiarism is a serious infringement of intellectual property rights. Any assignment that contains presumed plagiarism will be marked 0 (zero).

Since students are required to write group papers, students should sign a Statement of Authorship and attach it to their papers before paper submission. The form of Statement of Authorship is available at the Resource Center of the Program. Lecturer(s) and / or tutor(s) will refuse to mark any paper that has no signed Statement of Authorship attached.

In addition, students should ask for cover sheet from the Resource Center of the Program for any assignment submitted.

Penalty for plagiarism:

- First time: paper will be graded F
- Second time: final grade for the specific course will be graded F
- Third time: expelled from FEB UI

L. Statement of Authorship

Student should attach and sign the statement of authorship (provided by the resource center) to every paper they produce. All group members should sign the statement. Lecturer will not accept the paper without this attachment, or alternatively may reduce the mark given.

Statement of Authorship

Saya/kami yang bertanda tangan di bawah ini menyatakan bahwa makalah/tugas terlampir adalah murni hasil pekerjaan saya/kami sendiri. Tidak ada pekerjaan orang lain yang saya/kami gunakan tanpa menyebutkan sumbernya.

Materi ini tidak/belum pernah disajikan/digunakan sebagai bahan untuk makalah/tugas pada mata ajaran lain kecuali saya/kami menyatakan dengan jelas bahwa saya/kami menyatakan dengan jelas bahwa saya/kami menyatakan menggunakannya.

Saya/kami memahami bahwa tugas yang saya/kami kumpulkan ini dapat diperbanyak dan atau dikomunikasikan untuk tujuan mendeteksi adanya plagiarisme.

Nama	•
NPM	:
Tandatangan	:
Mata ajaran	:
Judul makalah/tugas	:
Tanggal	:
Dosen (dibuat oleh seluruh ma	: sing-masing mahasiswa)