UNIVERSITY OF DELHI
DEPARTMENT OF ECONOMICS
UNIVERSITY OF DELHI

Subject: B.A.(H) ECONOMICS DSC
Sem.: II
Course & Code: Intermediate Mathematical Methods for Economics ECON005 Credit: 4
Duration (per week): 4 hours (3 lectures + 1 tutorials)
Date & Time 28/11/2024 at 3:00 PM
Venue: Online (using Google Meet)
Convenor: Sugata Bag/ Sandip Datta
College Teachers attended:

Sl. No.	Teachers Name College
1	Madhuri Singh
2	Ms Akansha
3	Deepali Rajput
4	Naresh Malik
5	Ms Neha
6	Nidhi Pande
7	Ranjan Swarnakar
8	Ravinder Meena
9	Swagat Rout
10	Shruti Goyal
11	Anurag Kakkar
12	Ravinder Ram
13	Preeti Mann
14	Niti Khandelwal
15	Chetan Kumar

The committee discussed and agreed upon the following points.

A. There will be no change in the syllabus coverage. However, it is to be reiterated that the following sections/results were decided to be **deemphasized** from the syllabus for students as treatments of these topics in the book (Sysaeter and Hammond, 2002) are inadequate or not suitable:

- Section 13.3 (Determinants of order *n*)
- Proof of Theorem 13.3 (Rules for Determinants), though the statement of the theorem should be retained.
- Proof of Formula 13.19 (Cofactor expansion of determinants of order n). •

Example. 15.27 (Linear Regression).

- Sections 16.6 and 16.7 on Leibniz's Formula
- Section 16.10 (Implicit Function Theorem).
- The Continuous version of Jensen's inequality (Pg. 643-44).
- Section 14.6 (Spectral Theorem)

To be noted that this was decided in the previous meeting (held on 23-01-2024)

B. Suggested teaching hours and the weightage for broad two parts of the course are as follows:

	Teaching Hours	Weightage
Calculus	25 hrs	around 55%
Linear Algebra	22 hrs	around 45%

C. The structure of the final term examination paper will be simplified (by removing the sections that were followed earlier), and, from now on, there will be a total of 10 questions, out of which students are supposed to answer any 9.

D. The examination paper will feature questions of diverse complexity levels, from simple to advanced. Each question may preferably have up to two parts.

E. Internal Assessment (30 marks) will comprise of 6 marks for attendance, and two class tests (worth 12 marks each).

F. Continuous Assessment (40 marks) will comprise of 5 marks for attendance and 35 marks for two in-class quizzes and assignments.

G. The book titled, "Linear Algebra and its Applications" (4^{th} edition, 2012) by David Lay may be continued with as a reference for teachers and not for students for the current academic session.

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Subject:	B.A.(H) ECONOMICS DSC
Sem.:	II
Course & Code:	Intermediate Mathematical Methods for Economics ECON005
Credit:	4
Duration (per week):	4 hours (3 lectures + 1 tutorials)
Date & Time	23/01/2024 at 10:30 AM
Venue:	Amex, Department of Economics, Delhi University
Convenor:	Sugata Bag

College Teachers attended:

Sl. No.	Teachers Name	College
1	Ankur Jain	Ramjas College
2	Nidhi Gupta	SRC College
3	Sneha Bhardwaj	Deshbandhu Collected
4	Pratishtha Chaturvedi	Indraprastha College for Women
5	Bhavna Seth	Dyal Singh College
6	Priyambada Gupta	Shyam Lal College
7	Dr Harpreet Kaur	SGGBS College of Commerce
8	Deepanshi Rajput	Janki Devi Memorial College
9	Indranil Chowdhury	PGDAV College
10	Niti khandelwal Garg	Kirori Mal College
11	Anjali Gupta	Kalindi College
12	Ankur Jain	Ramjas College
13	Gita Golani	SPM College
14	Niti Bhutani	Hindu College
15	Deepanshu Yadav	SBS College
16	Sandeep Kanyal	ARSD College
17	Sonakshi Jain	Sri Venkateswara College
18	Anita	Lakshmibai College
19	Nidhi Pande Aggarwal	DCAC
20	Sanjeev Grewal	St Stephens College
21	Ranjan Swarnkar	ARSD College
22	Rupali Sharma	
23	Menka Singh	
24	Abhish Singh	

The attendees engaged in a discussion over two specific elements of the course: the extent of material covered and the format of the final term test paper. There was a discussion on bringing uniformity in the final term examination papers of Mathematical Economics across different semesters. The forum acknowledged that the scope is extensive and it is impractical to cover all the subsections of various mandated chapters in the primary textbook. The forum also

deliberated on a series of topics that are not contributing substantially to the course but are using a considerable amount of the limited classroom time. The following decisions were made:

1. Establish a sub-committee to conduct a comprehensive review of the syllabus and compile a list of topics that can be excluded.
2. Volunteers were invited for this sub-committee.
3. Sub-committee was formed, comprising the following members -

Anjali Bansal	Kalindi College
Anita Chauhan	Lakshmibai College
Niti Khandelwal Garg	Kirori Mal College
Sneha Bhardwaj	Deshbandhu College
Dipanshu	Shaheed Bhagat Singh College

4. After the sub-committee presents its recommendations, a subsequent meeting will take place on January 30, 2024.
5. The sub-committee convened via Google Meet on January 29, 2024 at 4 PM
6. Notice for the follow-up meeting was circulated immediately after that.

The follow-up second meeting took place on January 30, 2024. All the college teachers, who attended previously, joined again over Google Meet at 7:30 PM.

1. The recommendation put forth by the subcommittee was presented.
2. The sub-sections/results that the subcommittee recommended be eliminated were deliberated upon.
3. The subsequent recommendations were finally endorsed: –

A. The following sections/results were deemed irrelevant and or inadequately treated in the book (Sysaeter and Hammond, 2002) and hence will **be deleted** from the syllabus for students:

- Section 13.3 (Determinants of order *n*)
- Proof of Theorem 13.3 (Rules for Determinants), though the statement of the theorem should be retained.
- Proof of Formula 13.19 (Cofactor expansion of determinants of order n).
- Example. 15.27 (Linear Regression).
- Sections 16.6 and 16.7 on Leibniz's Formula
- Section 16.10 (Implicit Function Theorem).
- The Continuous version of Jensen's inequality (Pg. 643-44).
- Section 14.6 (Spectral Theorem)

B. The final term examination paper may consist of three sections, and each section will comprise questions with varying degrees of difficulty. The following scheme can be adopted:

- Section A: 40 marks (4 questions out of 6 carrying 10 marks each).
- Section B: 30 marks (3 questions out of 4 carrying 10 marks each).
- Section C: 20 marks (2 questions out of 3 carrying 10 marks each).

C. The book titled, "Linear Algebra and its Applications" (4^{th} edition, 2012) by David Lay may be continued with as a reference for teachers and not for students for the current academic session.

Department of Economics
Delhi School of Economics
University of Delhi

Minutes of Meeting

Subject: B.A. (Hons) Economics, Second Semester
Course : (ECON 005) Intermediate Mathematical Methods for Economics
Credits: 4
Duration (per week): 4 hours (3Lectures + 1 Tutorial)
Date: March 17, 2023
Venue: Virtual Meeting
Chairs: Sandip Datta and Sugata Bag

The meeting was attended by the following teachers:

Sl. No.	Teacher Name	College Name
1	Akanksha	Daulat Ram College
2	Nidhi Pande Aggarwal	DCAC
3	Niti Khandelwal Garg	Kirori Mal College
4	Sanjeev Grewal	St Stephens College
5	Nidhi Gupta	SRCC
6	Sandhya Varshney	Dayal Singh College
7	Shruti Sabharwal	Jesus & Mary College
8	Sonam Gupta	Hansraj College
9	Surbhi Gupta	LSR College
10	Gita Golani	Shyama Prasad Mukherji College
11	Jasneet Kaur Wadhwa	SGTB Khalsa College
12	Harpreet Kaur	Sri Guru Gobind Singh College of Commerce
13	Manavi Jain	Miranda House College
14	Sonakshi Jain	Sri Venkateswara College
15	Nikita Gupta	Shivaji College
16	Nivedita Mullick	Gargi College
17	Ranjan Swarnakar	ARSD College
18	Anita Mathur	SRCC
19	Neha	ARSD College
20	Akanksha Aggarwal	Jesus Mary College
21	Ganita Bhupal	Rajdhani College
22	Anita	Lakshmibai College

The teachers present (online) discussed various aspects of the course itself and the teaching and evaluation process for the current semester. The committee agreed on the followings:

1. The syllabus and the reading list for the course during the current semester remain unchanged. However, the book "*Linear Algebra and its applications*" (4th Edition, 2012) by David Lay (Pearson) is suggested as a teacher's reference.

Essential Readings:

- [SH 2002] Sydsaeter, K., Hammond, P. (2002). *Mathematics for economic analysis*, Pearson Educational.
- [HLMRS 2001] Hoy, M., Livernois, J., McKenna, C., Rees, R., Stengos, T. (2001). *Mathematics for Economics*, Prentice-Hall India.

2. There was a fairly wide-ranging discussion on various aspects of the evaluation process. There are 3 stages of assessments. The following pattern will be followed -

I. Internal Assessment (IA): 30 marks –
   - two class tests (12 marks each), and
   - 6 marks for attendance.

II. Continuous Assessment (CA): 40 marks –
   - At least 2 written class tests/class assignments, adding up to total 30 marks.
   - The rest 5 marks could also be based on class tests or oral quizzes/ tutorial participation at the discretion of the teacher concerned.
   - 5 marks for attendance

III. The end semester exam: 90 marks will comprise numerical and other questions.

Suggestive pattern for the end-semester final examination:

- roughly equal weights for each unit
- The question paper will comprise of three parts –
   - with varying degrees of difficulty
   - each part will have questions from each unit
   - Part – A: 40 marks – 5 questions, 8 marks each
   - Part – B: 30 marks – 3 questions, 10 marks each
   - Part – C: 20 marks – 2 questions, 10 marks each

DISCIPLINE SPECIFIC CORE COURSE – 5
(DSC-5): INTERMEDIATE MATHEMATICAL METHODS FOR ECONOMICS

The syllabus, teaching hours and topic-wise reading references –

1. UNIT –I: Linear Algebra **(15 Hours)**
   Vector spaces: algebraic and geometric properties, scalar product, norm, orthogonality; linear transformations: properties, matrix representation and elementary operations; systems of linear equations: properties of their solution sets; determinants: characterization, properties and applications; eigenvalues and eigenvectors, diagonalization, spectral theorem.
   Ref: SH 2002, chapters – 12, 13, 14

2. UNIT – II: Functions of several real variables **(15 Hours)**
   Geometric representation: graphs and level curves; differentiable functions: characterisation, properties concerning various operations and applications; second order derivatives: properties and applications; the implicit function theorem, application to comparative statics; homogeneous and homothetic functions: characterisation, applications.
   Ref: SH 2002, chapters – 15, 16

3. UNIT – III: Multivariate optimization **(15 Hours)**
   Convex sets; geometric properties of functions: convex functions, their characterisation, properties and applications; quasi-convex functions, their characterisation, properties and applications; unconstrained optimisation: geometric characterisation, characterisation using calculus, applications.
   Ref: SH 2002, chapters – 17