



**Future Academy**  
**Higher Future Institute for Specialized Technological Studies**

**Course Specification**

**1- Course information:**

<b>Course Code:</b>	MTH 111
<b>Course Title:</b>	Pure Mathematics
<b>Year/level</b>	1 <sup>st</sup>
<b>Academic Programs</b>	<b>Business Administration Program (B.Sc.)</b>
<b>Contact hours/ week</b>	<b>Theoretical 3 hrs. / Tutorial 2 hrs. = Total 5 hrs.</b>

**2- Course aims:**

The aim of this Pure Mathematics course is to provide a solid foundation in mathematical concepts essential for analyzing business and financial problems. It focuses on developing problem-solving skills, fostering analytical thinking, and introducing mathematical modeling techniques applicable to real-world business scenarios. Students will gain proficiency in calculus, linear algebra, and optimization methods, enhancing their ability to make data-driven decisions. The course prepares students for more advanced studies in quantitative fields while emphasizing ethical considerations in business decision-making. Ultimately, it equips students with the necessary mathematical tools to excel in business and accounting.

**3- Intended learning outcomes of the course (ILOs):**

**a- Knowledge and understanding:**

**On successful completion of this course, the student should be able to:**

- a-1: Understand fundamental mathematical concepts, including calculus, linear algebra, and mathematical modeling, relevant to business applications.
- a-2: Gain proficiency in solving business-related problems using mathematical techniques, such as optimization and financial analysis.
- a-3: Comprehend the role of mathematical methods in quantitative decision-making and business strategy development.
- a-4: Develop the ability to analyze and interpret mathematical data for use in financial forecasting, budgeting, and market analysis.
- a-5: Understand the ethical implications of using mathematical models in business decisions and their impact on economic systems and society.

**b- Intellectual skills:**

**On completing this course, the student should be able to:**

b-1: Develop the ability to think logically and critically, applying mathematical reasoning to solve complex business problems.

b-2: Enhance problem-solving skills by using mathematical techniques to model and analyze real-world business situations.

b-3: Cultivate the ability to analyze quantitative data and make informed decisions based on mathematical insights.

b-4: Demonstrate the capacity to synthesize mathematical concepts and apply them to interdisciplinary fields such as economics and finance.

b-5: Improve abstract thinking skills, allowing for the generalization and application of mathematical theories to a variety of business contexts.

**c- Professional and practical skills:****At the end of this course, the student will be able to:**

c-1: Apply mathematical techniques to solve practical problems in business, accounting, and finance.

c-2: Use mathematical software and tools to analyze data, create models, and perform simulations for business decision-making.

c-3: Demonstrate proficiency in interpreting and presenting mathematical findings clearly and effectively in a business context.

c-4: Develop the ability to work with mathematical models to optimize business processes, such as cost management and revenue forecasting.

c-5: Integrate mathematical methods into business strategies for improved financial planning, risk management, and performance evaluation.

**d- General and transferable skills:****On successful completion of this course, the student should be able to:**

d-1: Enhance critical thinking and analytical skills, enabling students to approach complex problems with a structured and logical mindset.

d-2: Improve communication skills by presenting mathematical concepts and solutions clearly, both in written and verbal formats.

d-3: Develop time-management and organizational skills by balancing mathematical tasks with real-world business applications.

d-4: Foster teamwork and collaboration by working with peers to solve mathematical problems and apply concepts in business contexts.

d-5: Build a strong foundation in quantitative reasoning that is applicable across various professional fields, including finance, economics, and data analysis.

**4- Course contents**

Weeks	Topics/units	Number of hours		ILO's
		Lecture hours	Practical hours	
1	Basic Mathematical Concepts: Review of arithmetic, algebra, and functions relevant to business applications.	3	2	a1, b2, c3, c4, d3

<b>2</b>	Linear Algebra: Vectors, matrices, determinants, eigenvalues, and eigenvectors, with applications in business and economics.	3	2	a2, b3, C2, d5
<b>3</b>	Calculus I: Limits, derivatives, and their applications in optimization and cost functions.	3	2	a4, b2, c3, d3
<b>4</b>	Calculus II: Integration techniques, applications to business problems such as area, volume, and growth models.	3	2	a2, b1, c1, d5, d3
<b>5</b>	Differential Equations: Basic introduction to solving differential equations and their application in modeling business processes and financial growth.	3	2	a2, b3, c3, d4
<b>6</b>	Optimization Methods: Techniques for finding maximum and minimum values, linear programming, and constrained optimization.	3	2	a1, b5, c5, d2
<b>7</b>	Mid-semester exam	1		a5, b5, c4, d5
<b>8</b>	Sequences and Series: Arithmetic and geometric sequences, convergence, and their relevance in financial modeling.	3	2	a3, b3, c3, d1, d5
<b>9</b>	Probability and Statistics: Introduction to probability theory, distributions, statistical analysis, and their applications in business forecasting.	3	2	a3, b3, c3, d1, d5
<b>10</b>	Mathematical Finance: Time value of money,	3	2	a1, a2, b2, c3, d1

	compound interest, annuities, and financial modeling.			
<b>11</b>	Matrix Operations: In-depth study of matrix operations, systems of linear equations, and their business applications.	3	2	a1, a2, b2, c3, d1
<b>12</b>	Mathematical Modelling in Business: Constructing mathematical models for business problems, including cost, revenue, and demand forecasting.	3	2	a3, b4, c2, d5
<b>13</b>	Game Theory: Introduction to strategic decision-making and its use in competitive business environments.	3	2	a3, b4, c2, d5
<b>14</b>	Risk Analysis and Management: Mathematical techniques for assessing and managing risk in business, such as probability distributions and expected value.	3	2	a5, b5, c4, d5

## 5- Teaching and learning methods

Methods	ILO's																			
	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
<b>Lectures</b>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
<b>Practical sections</b>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
<b>Self-learning</b>		√				√							√				√			

Assays and reviews																				
Discussion groups																				
Problem-Solving																				
E-Learning																				
Blended learning																				

## 6- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help
- More quizzes to assess their ability for understanding the course
- Encourage the team work for those students with other advanced ones to increase their participation and understanding

## 7- Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs
Course Work ( Tutorial Exercise and Assignments)	30 minutes	15	Every week	a1,b2,c3,d1,d2,
Quiz 1	1 Hrs.	5	Week#4	c3, d5
Mid-term exam	1 Hrs.	15	Week#7	c4, d5
Quiz 2	1 Hrs.	5	Week#11	c5, d4
Final Written exam	2 Hrs.	60		a5, b5

## 8-List of references

### 8.1. Student notebooks:

Mishra, M. (2022). *Application of mathematics in business and economics*. SlideShare. Retrieved, from <https://www.slideshare.net/slideshow/application-of-mathematics-in-business-and-economics/70373752>

## **8.2. Essential textbooks:**

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## **8.3. Recommended textbooks:**

Anthony, M., & Biggs, N. (1996). *Mathematics for Economics and Finance*. Cambridge University Press.

## **8.4. Journals, Periodical and Reports .....etc.**

Dospinescu, O. (2022). Business and economics mathematics. *Mathematics*, 10(20), 3890.

## **8.5. Websites**

**Wiley Online Library.** (n.d.). *Mathematics for economics and finance*. Wiley. Retrieved, from <https://onlinelibrary.wiley.com>

**Course Coordinator: Ass. Prof. Mahmoud Gabr**

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