

Applied Mathematics Curriculum

Academic Year 2023 / 2024 onwards

Summary of Total Credits	Credit
Core	22
Specialized	72
Restricted Elective (or Minor)	18
General (Islamic Theology, Languages, Physical Education and etc.)	22
Enterprise and Entrepreneurship	5

Core Subjects

Subject Title	Credit	Prerequisite Subject(s)
Calculus I	4	No Prerequisite
Calculus II	4	Calculus I
Calculus III	3	Calculus II
Differential Equations	3	Calculus II
Foundations of Mathematics I	3	No Prerequisite
Mathematics Lab. I	1	* Calculus I
Mathematics Lab. II	1	Mathematics Lab. I , * Calculus II
Introductory Computer Programming	3	No Prerequisite

* Can Be Selected Simultaneously with

Required Specialized Subjects

Subject Title	Credit	Prerequisite Subject(s)
Introductory Linear Algebra	4	Foundations of Mathematics I
Introductory Combinatorics	4	Foundations of Mathematics I
Introductory Abstract Algebra	4	Foundations of Mathematics I
Abstract Algebra I	3	Introductory Abstract Algebra
Foundations of Mathematics II	2	Foundations of Mathematics I
Introductory Mathematical Modeling	3	Calculus I
Mathematical Modeling	3	Introductory Mathematical Modeling, Differential Equations
Introductory Numerical Analysis	4	Calculus II
Numerical Linear Algebra	3	Introductory Numerical Analysis, Introductory Linear Algebra
Introductory Mathematical Analysis	4	Foundations of Mathematics I
Mathematical Analysis I	3	Introductory Mathematical Analysis
Functions of a Complex Variable	3	Introductory Mathematical Analysis
Topology	3	Introductory Mathematical Analysis
Introductory Dynamic Systems	3	Introductory Mathematical Analysis
Probability and Statistics I	3	No Prerequisite
Calculus of Variations	3	Differential Equations
Operations Research	4	Introductory Linear Algebra
Theory of Ordinary Differential Equations	3	Differential Equations, Introductory Mathematical Analysis

Elective Specialized Subjects

(Total of 13 Credits Must be Selected)

Subject Title	Credit	Prerequisite Subject(s)
Non-Linear Programming	3	Operations Research
Linear Algebra	3	Introductory Linear Algebra
Numerical Solution of Differential Equations	3	Differential Equations, Introductory Numerical Analysis
Stochastic Processes	3	Probability and Statistics I
Introductory Geometry	3	Foundations of Mathematics II
Introductory Differential Geometry	3	Calculus II
Partial Differential Equations	3	Differential Equations, Introductory Mathematical Analysis
Graph Theory	3	Introductory Combinatorics
Introductory Number Theory	3	Foundations of Mathematics II
Object Oriented Programming	3	Introductory Computer Programming
Mathematical Software	3	Introductory Computer Programming
Statistical Software	1	Probability and Statistics I
Applied Software	1	No Prerequisite

Restricted Elective Subjects

(Minimum of 12 Credits Must be Selected by Students without a Chosen Minor)

Subject Title	Credit	Prerequisite Subject(s)
Introductory Group Theory	3	Introductory Abstract Algebra
Introductory Algebraic Geometry	3	Introductory Linear Algebra, Abstract Algebra I
Module Theory	3	Introductory Linear Algebra, Abstract Algebra I
Abstract Algebra II	3	Abstract Algebra I
Introductory Logic and Set Theory	3	Foundations of Mathematics I
Introductory Algebraic Topology	3	Introductory Abstract Algebra, Topology
Introductory Differential Topology	3	Topology
Differential Geometry I	3	Introductory Differential Geometry
Mathematical Analysis II	3	Mathematical Analysis I
Introductory Functional Analysis	3	Mathematical Analysis I
Fourier Analysis	3	Mathematical Analysis I
Matrix Analysis	3	Mathematical Analysis I
Fuzzy Mathematics	3	Foundations of Mathematics I
Numerical Analysis	3	Numerical Linear Algebra
Discrete Optimization	3	Operations Research
Game Theory	3	Introductory Combinatorics, Operations Research
Multiple Criteria Decision Analysis	3	Operations Research
Combinatorics and Applications	3	Introductory Combinatorics
Introductory Coding Theory	3	Introductory Abstract Algebra

Data Structures and Algorithms	3	Object Oriented Programming
Design and Analysis of Algorithms	3	Object Oriented Programming, Data Structures and Algorithms
Introductory Data Mining	3	Probability and Statistics I
Artificial Intelligence	3	Data Structures and Algorithms
Machine Learning	3	Introductory Combinatorics, Introductory Computer Programming
Project Control	3	Probability and Statistics I , Operations Research
Probability and Statistics II	3	Probability and Statistics I
Technical English for Mathematics	3	*
History of Mathematics	3	*
Philosophy of Mathematics	3	*
Strategies for Mathematical Problem Solving	3	*
Selected Topics in Applied Mathematics	3	Requires Head of Department's Permission and **
Undergraduate Project	3	**

* Have Passed Minimum of 60 Credits

** Have Passed Minimum of 100 Credits

Minor of Computer Science Subjects

Subject Title	Credit	Prerequisite Subject(s)
Python Programming	3	Introductory Computer Programming
Object Oriented Programming	3	Introductory Computer Programming
Web Programming	3	Databases
Data Structures and Algorithms	3	Object Oriented Programming
Design and Analysis of Algorithms	3	Data Structures and Algorithms
Operating Systems	3	Data Structures and Algorithms
Databases	3	Data Structures and Algorithms
Information Systems Architecture	3	Python Programming
Statistical Data Analysis	3	Probability and Statistics I
Introductory Machine Learning	3	Introductory Computer Programming, Introductory Combinatorics
Introductory Deep Learning	3	Introductory Machine Learning
Artificial Intelligence	3	Data Structures and Algorithms
Computer Programming Lab.	1	Introductory Computer Programming

Minor of Data Science Subjects

Subject Title	Credit	Prerequisite Subject(s)
Python Programming	3	Introductory Computer Programming
Object Oriented Programming	3	Introductory Computer Programming
Data Structures and Algorithms	3	Object Oriented Programming
Design and Analysis of Algorithms	3	Data Structures and Algorithms
Artificial Intelligence	3	Data Structures and Algorithms
Natural Languages Processing	3	Python Programming
Introductory Data Mining	3	Probability and Statistics I
Introductory Machine Learning	3	Introductory Computer Programming, Introductory Combinatorics
Introductory Deep Learning	3	Introductory Machine Learning
Statistical Data Analysis	3	Probability and Statistics I
Regression I	3	Introductory Linear Algebra, Probability and Statistics I
Applied Time Series Analysis	3	Probability and Statistics I
Computer Programming Lab.	1	Introductory Computer Programming, * Object Oriented Programming
Fundamentals of Big Data	3	DataBases
Startup Design and Development	3	Introductory Computer Programming
Basics of Digital Economics	3	Introductory Computer Programming

* Can Be Selected Simultaneously with

Minor of Industrial Engineering Subjects

Subject Title	Credit	Prerequisite Subject(s)
Principles of Macroeconomy I	2	No Prerequisite
Principles of Macroeconomy II	2	Principles of Macroeconomy I
Engineering Economics	3	Principles of Macroeconomy I , Probability and Statistics I
Work Study	3	No Prerequisite
Management and Organization Theory	3	No Prerequisite
Non-Linear Programming	3	Operations Research
Transportation Planning	3	Operations Research
Production Planning	3	Production Planning and Inventory Control
Queueing theory	3	Operations Research, Probability and Statistics I
Production Planning and Inventory Control	3	Operations Research, Probability and Statistics I
Project Control	3	Operations Research, Probability and Statistics I
Facilities Layout Design	3	Work Study
Statistical Quality Control	3	Probability and Statistics I
Management Information Systems	3	Introductory Computer Programming
Basics of Digital Economics	3	Introductory Computer Programming

Minor of Economics Subjects

Subject Title	Credit	Prerequisite Subject(s)
About Economics	3	No Prerequisite
Principles of Macroeconomy II	2	Principles of Macroeconomy I
Principles of Accounting I	3	No Prerequisite
Principles of Accounting II	2	Principles of Accounting I
Microeconomics I	3	Principles of Macroeconomy II
Microeconomics II	3	Microeconomics I
Macroeconomics I	3	Microeconomics I
Financial Management I	3	Principles of Accounting II
Intermediate Accounting I	3	Principles of Accounting II
Industrial Accounting I	3	Principles of Accounting II
Principles of Auditing I	3	Intermediate Accounting I
Game Theory and Applications in Economics	3	Microeconomics II

Minor of Mathematical Education Subjects

Subject Title	Credit	Prerequisite Subject(s)
Strategies for Mathematical Problem Solving	3	*
Mathematics Education I	3	*
Mathematics Education II	3	Mathematics Education I
Assessment in Mathematics Education	3	Mathematics Education II
Digital Technology in Mathematics Teaching and Learning	3	Mathematics Education II
Mathematical Modelling in Education	3	Mathematics Education II
Mathematics Teaching and Learning in Tertiary	3	Mathematics Education II
Mathematics Teaching and Learning in School	3	Mathematics Education II
Instructional Design	2	No Prerequisite
Psychology of Education	3	No Prerequisite
Models and Strategies of Teaching	2	Psychology of Education

* Have Passed Minimum of 60 Credits

Minor Guidelines

- Students without a chosen Minor must select 18 credits from **Elective** subjects. This includes at least 12 credits from **Restricted Elective** subjects or other subjects from **Elective Specialized** subjects. Alternatively, 6 credits of **Unrestricted Elective** subjects can be selected (This request must be accepted by both Heads of Pure and Applied Mathematics departments).
- Students with a chosen Minor must pass 18 credits worth of subjects from their respective Minor to be able to graduate.

- When a student is not able to complete their chosen Minor, it would be possible (with the permission of Applied Mathematics head of department) to consider passed subjects from their Minor as **Elective** subjects.