School	School of Arts & Science
Major	Bachelor of Mathematics

General Education Requirements			
Code	**Title**	**Credits**	**Description**
ARAB200	Arabic Language and Literature	3	تتألف مادة اللغة العربية وآدابها لغير المتخصصين من ثلاثة أقسام، أحدها يتناول دروساً أساسية في النحو والصرف والبلاغة. والثاني يتناول مباحث في الأدب والتحليل. أما القسم الثالث فيعالج بعض تقنيات التعبير والتواصل.
CSCI200	Introduction to Computers	3	The course aims at making students competent in computer-related skills. It is supposed to develop basic computer interface knowledge by providing an overview of managing folders and files, opening a start menu, and hands-on practice on typical software applications such as Word, Excel, and PowerPoint. The student will learn how to use the new features of Microsoft Office 2017, mainly Word documents, Excel spreadsheets, and PowerPoint presentations. Moreover, the course aligns with the Cisco Networking Academy® Get Connected course, which helps students understand how to connect to the Internet.
CULT200	Introduction to Arab - Islamic Civilization	3	تُمثّل الحضارة العربية الإسلامية واحدة من أهم الحضارات في التاريخ بما أنجزته من إبداعات علمية وثقافية وحضارية تركت أثرها العظيم في تاريخ البشرية. تُشكّل هذه المادة الدراسية مقدمةً أساسية ليتعرف كل عربي على تاريخ حضارته، لا ليفتخر بها وحسب، بل ليجعل منها حافزًا يستنهض به قابليّاته وقدراته العلمية الكامنة لإعادة الاستنهاض الحضاري. يتحرك الماضي فينا دون شعورٍ واعٍ منّا، على أنّ هذا المُقرّر الدراسي يحاول أنْ يستثير الوعي الحضاري والثقافي عند الطلاب العرب، فيستفيد من هذا المخزون ليصنع أُفقًا جديدًا للمستقبل.
ENGL201	Composition and Research Skills	3	This course builds upon the skills acquired in pre-requisite courses mainly ENGL 151 to further develop students' critical thinking and academic writing competencies. Students will read and respond to a variety of texts from different disciplines and produce a research paper using analytical and critical skills in response to texts.
ENGL251	Communication Skills	3	Workplace Occupational Writing is an advanced interdisciplinary writing course emphasizing workplace and technical communication and editing appropriate to diverse professions. It incorporates practice and study of selected types of discourse employed in professional writing situations, preparing students for different systems of writing in their professional lives. Examples from the writing of workplace professionals are analyzed and used as models to demonstrate the transition from academic to professional writing.

Core Requirements			
Code	**Title**	**Credits**	**Description**
CSCI250	Introduction to Programming	3	This course introduces the basic concepts and principles of structured programming in Java. It starts with an introduction to Java showing its syntax and the structure of a program in Java then teaches simple data types, control structures, methods, arrays, and strings.
CSCI250L	Introduction to Programming Lab	1	This course is a co-requisite for the Introduction to Programming course (CSCI250). The students apply in the lab the fundamentals of programming explained in CSCI250 by solving lab exercises. In this lab, students solve programming problems by using primary data types, selection and repetition structures, methods and arrays. This lab is an opportunity for the students to have direct help when needed from the instructor, but it is not sufficient for practice; students should practice with more exercises on their own.
MATH210	Calculus II	3	This is the second course in the Calculus sequence. The course material includes logarithmic, exponential, and trigonometric functions, their inverses and their derivatives, integration techniques, improper integrals, sequences, infinite series, tests of convergence, alternating series, power series, polar coordinates and its application.
MATH220	Calculus III	3	The course consists of two parts: Multivariable calculus and vector calculus. The multivariable calculus is the extension of calculus in one variable to calculus in more than one variable: (quadric surfaces, partial differentiation, multiple integration). Vector calculus applies calculus to the concept of vector fields.
MATH225	Linear Algebra with Applications	3	This course provides an introduction to linear algebra topics. Emphasis is placed on the development of abstract concepts and applications for vectors, systems of equations, matrices, determinants, vector spaces, multi-dimensional linear transformations, eigenvectors, eigenvalues, diagonalization and orthogonality. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering.

MATH260	Discrete Mathematics	3	This course introduces discrete mathematical structures. Students will learn how to use logical and mathematical formalisms to formulate and solve problems in computer engineering. Topics include formal logic, proof techniques, recurrence relations, sets, combinatorics, relations, functions, algebraic and structures.
MATH260L	Discrete Mathematics Lab	1	This course is designed, for Math students only in order to cover the fundamentals of Mathematics. Students will learn how to use logical and mathematical formalisms. Topics include formal logic, proof techniques, recurrence relations, sets, combinatorics, relations, functions, algebraic and structures.
MATH270	Ordinary Differential Equations	3	This course provides an introduction to ordinary differential equations and their applications. The contents of this course include first order equations, separable, exact, and linear equations, second and higher order differential equations, systems of differential equations, series solutions, and Laplace transformation.
MATH310	Probability & Statistics for Scientists & Engineers	3	The course is intended to provide you with the basic probabilistic and statistical concepts with related computational and analytic skills for three main purposes: 1) To become an integrated part of the student scientific education. 2) To give the student an adequate ability for comprehending and interpreting many non-deterministic situations. 3) To appreciate the wide range of applications of such concepts to real-life situations.
PHYS210	Mechanics	3	The scope of this course is to provide a basic understanding of mechanics for science students. I offer an introduction to linear motion in one and two dimensions, laws of motion, work and energy of a system, linear and angular momentum, and circular angular motion.

PHYS250	Thermodynamic and Waves	3	This course is designed to provide an introduction to thermodynamics, fluids and waves. Students will familiarize themselves with the concepts of simple harmonic motion, wave motion and superposition of waves. Then, both fluid statics and fluid dynamics will be discussed. In the last part on thermodynamics, the notions of temperature, heat and calorimetry will be introduced followed by the ideal gas law.
PHYS280	Electricity and Magnetism	3	This course provides an overview of electromagnetism. Students will familiarize themselves with the concepts of electrical fields, Gauss Law, electrical potential difference, electrical potential energy, current, Kirchhoff's laws, DC circuits, magnetic fields, Ampere's Law, Faraday's law. Finally, all topics studied will be summarized by Maxwell's equations. Modern applications of the material will be discussed, and important problem solving strategies and skills will be developed.
PHYS360	Analytical Mechanics	3	This course aims to provide students with further insight into the principles and behaviour of mechanical systems. We will start with a brief overview of Newtonian Mechanics; followed by a detailed discussion of oscillations. Then we move on to introduce the Lagrangian and Hamiltonian approaches. Central force motion is then analysed using both the Newtonian and the Lagrangian approaches. Finally, motion in non-inertial systems, and coupled oscillators are briefly analysed.

Major Requirements			
Code	**Title**	**Credits**	**Description**
MATH305	Programming Languages for Scientist	3	This course on scientific programming has been designed to introduce the students to the world of numerical implementation using the programming Languages MATLAB.
MATH315	Advanced Linear Algebra	3	The course aims at developing further concepts in Linear algebra. Particularly, the course explores the link between linear transformations and matrices, and give basic notions in complex vector spaces. One orientation of the course is in applying methods of linear algebra to solve other problems, like in differential equations or in plane geometry
MATH330	Partial Differential Equations	3	Partial differential equations (PDEs) are an extremely useful tool on the exact sciences and engineering, and form an important area of pure and applied mathematics. The course investigates a variety of techniques to solve standard partial differential equations. Topics include First-Order Quasi-linear equations, method of characteristics, method of separation of variables, classifications of second order linear equations, Fourier series and their applications in PDEs, Laplace and Fourier Transforms and their applications in the theory of partial differential equations.
MATH345	Introduction to Real Analysis	3	This course covers the fundamentals of mathematical analysis: properties of the real number system including the algebraic, the order and completeness properties; the treatment of sequences of real numbers and the associated limit concept; the limit of functions and their algebraic properties. It also covers the continuity and differentiability of functions. It shows the utility of abstract concepts and teaches an understanding and construction of proofs.
MATH365	Abstract Algebra	3	This undergraduate course focuses on traditional algebra topics that have found greatest application in science and engineering as well as in mathematics. Topics include: groups, subgroups, cyclic groups, permutation groups, reflections and rotations of the complex plane, dihedral groups, orbits cycles and the alternating groups, Cosets and Theorem of Lagrange, Homomorphisms, factor groups, simple groups, group actions, Isomorphism Theorems.

MATH375	Numerical Methods for Scientists & Engineers	3	This course is a study of mathematical techniques used to find numerical solutions to the mathematically formulated problems that do not have exact analytical solutions. This course includes the following computational techniques: root-finding techniques, interpolation and polynomial approximation, numerical differentiation and integration, extrapolation techniques and numerical schemes for solving initial-value problems for first and higher order ordinary differential equations. In computer practical, laboratory sessions involve the implementation of the above numerical methods in practice using MATLAB.
MATH380	Complex Variables	3	This course is an introductory course in the theory and applications of functions of a complex variable. The text covers the basic topics in complex analysis as complex numbers, complex functions, limits, continuity, and differentiability. It also covers complex and contour integration, Taylor series, Laurent series, zeroes, residues and poles, and applications of residues.
MATH385	Introduction to Topology	3	This course is an introduction to topology. It will provide an introduction to the definitions and concepts of topological spaces, metric spaces, connectedness, and compactness.
MATH405	Number Theory	3	This course covers topics related to the theory of numbers. It aims to provide the students with a background in classical number theory, introduce students to the divisibility of integers, congruencies, arithmetic functions, Diophantine equations, primitive roots, second order congruencies, quadratic residues, Legendre symbol, Jacobi symbol, higher order polynomial congruencies. Make the students knowledgeable of the applications of number theory in computer science and cryptography.
MATH420	Differential Geometry	3	Differential Geometry is designed to introduce students to the geometric structure of space or the universe’s geometry through the eyes of differential calculus. This course aims to build a solid mathematical understanding of the fundamentals of differential geometry with some intuition and visual appreciation of the given topics. It is essentially based on the calculus of several variables. This course considers curves and surfaces in Euclidean spaces, intrinsic properties, Frenet-Serret formulas, curvature, torsion, first and second forms, geodesics, and extrinsic invariants of surfaces First and Second forms.

MATH455	Mathematical Analysis	3	This course is not a collection of theorems and definitions, it is a way of thought. Our purpose is to present the theory of Riemann integrable functions and serve as a brief introduction to measure theory. Finding the area bounded by a curve goes back to ancient times, and Greeks and Egyptians developed an "exhausting" method for solving the problem. It was based on approximating the area under the curve by the known regions of triangles and rectangles and then limiting this process to infinity. In the middle of the nineteenth century, the theory of integration was propounded and developed by B. Riemann. Although this theory seems unrelated to continuity and differentiation, it has deep connections. For example, the fundamental theorem of calculus is a core connection in this theory. We aim to introduce the precise definition of Riemann integral reconciles the ideas of "integral as an area" and "integral as an antiderivative." It is perfectly feasible to limit the integration for a family of functions that is large enough for all purposes of elementary analysis. Lebesgue measure theory will be the only sensible answer when we need a more powerful tool. It is then convenient to introduce this theorem which generalizes the theory of Riemann integrable functions. A basic course in analysis including continuity differentiation and integral methods is a must. In particular, Math 345 is essential.
MATH490	Modern Topics in Algebra	3	The course is an introduction to ring and field theory, including: polynomial rings over a commutative ring, matrix rings, ideals and homomorphisms, quotient rings, Euclidean domains, principal ideal domains, unique factorization domains and field extensions.
MATH492	Mathematical Seminar	1	This is a one credit course, designed to help Math students become independent learners.