MATHEMATICS (MATH)

MATH 90 – Elementary Algebra   3 credit hours
This course deals with elementary concepts of algebra which are usually taught at the 9th grade level. Emphasis is placed on developing functional competence in the several areas of algebra which are covered, and the content includes some practical applications. Not a General Studies course. Credit will not count toward any UNK degree. Placement: Math ACT score of 16 or less.

MATH 101 – Intermediate Algebra   4 credit hours
This course is designed to prepare students for success in their General Studies mathematics class. Course topics include properties of real numbers, polynomial and rational expressions, factoring, exponents, radicals, and linear and quadratic equations.

MATH 102 – College Algebra   3 credit hours
A college level algebra course which includes a study of linear equations and inequalities, relations and functions, graphing of linear and quadratic functions, polynomial and rational functions, logarithmic and exponential functions, systems of equations, matrices, sequences and series, and other selected topics all of which are necessary for the study of calculus.
Prerequisite: MATH 101 or Math ACT Score of 20 or greater and two years of high school algebra Students may not enroll in MATH 102 after earning credit for MATH 115 or MATH 123..

MATH 103 – Plane Trigonometry   3 credit hours
Study of trigonometric functions.
Prerequisite: MATH 102 or Math ACT Score of 22 or greater and two years of high school algebra

MATH 104 – Concepts in Mathematics and Statistics   3 credit hours
An algebra course designed specifically for students going into elementary education. Many of the topics are similar to topics found in a traditional college algebra course. However, topics from the areas of probability and statistics have been included to give the prospective elementary teacher the necessary background to meet state and national curriculum standards for elementary mathematics.
Prerequisite: MATH 101 or Math ACT Score of 20 or greater and 4 years of high school mathematics.

MATH 106 – Mathematics for Liberal Arts   3 credit hours
An enrichment course investigating the structure, aesthetics, and philosophy of mathematics and its cultural relevance.

MATH 115 – Calculus I with Analytic Geometry   5 credit hours
Limits and continuity, differentiation of algebraic and trigonometric functions, elementary integration (with applications) of algebraic and trigonometric functions.
Prerequisite: MATH 103 or Math ACT score of 23 or above 4 yrs HS Math including 2 yrs algebra 1 yr geom and sr level pre-calc.

MATH 120 – Finite Mathematics   3 credit hours
An introduction to modern mathematical concepts, with applications. Includes logic, set theory, probability, vectors, matrices, linear programming, and game theory.
Prerequisite: MATH 102 or Math ACT score of 22 or greater and two years of high school algebra.

MATH 123 – Applied Calculus I   3 credit hours
The concepts of calculus with emphasis on applications to the areas of business, biology, economics, and the social and behavioral sciences. Credit cannot be received for both MATH 115 and 123.
Prerequisite: MATH 102 or Math ACT score 22/above 4 yrs HS math including 2 yrs algebra 1 yr geom sr level precalc course Students may not enroll in MATH 123 after earning credit for MATH 115.

MATH 150 – School Math from an Advanced Standpoint   3 credit hours
School Math from an Advanced Standpoint: This course surveys and expands on topics familiar to you from your prior mathematics courses. It shows how your prior knowledge can be found in or applied to Discrete Mathematics, Graph Theory, and Number Theory and deepens understanding of topics from Algebra, Trigonometry, Analytic Geometry, and Complex Numbers; a variety of other topics important to the study of advanced mathematics might be covered.
Prerequisite: MATH 103 or MATH ACT score of 23 or greater

MATH 202 – Calculus II with Analytic Geometry   5 credit hours
A continuation of MATH 115 including the differentiation and integration of transcendental functions, methods of formal integration with applications, series.
Prerequisite: MATH 115 or Math ACT score of 25 or greater and one year of high school calculus.

MATH 230 – Math for Elementary Teachers I   3 credit hours
In this course, preservice teachers develop knowledge of mathematics important for the effective teaching of PK-3 students. The mathematical topics investigated in the course include problem solving, the number system, alternate base systems, operations with whole numbers, introductory number theory concepts, introductory geometry and measurement, and data representation. In all of these topics, preservice teachers learn to develop appropriate mathematical explanations, understand student reasoning about mathematics, and communicate mathematical reasoning.
Prerequisite: MATH 102 or MATH 106 or Math ACT score of 20 or greater and four years of high school mathematics including two years of algebra and one year of geometry and a senior level mathematics course.

MATH 250 – Foundations of Math   3 credit hours
Topics of sets and symbolic logic are studied with the objective of using them in the detailed study of the nature of different types of proofs used in mathematics. Also, the processes of problem solving are studied for developing strategies of problem solving.
Prerequisite: MATH 115 or MATH 123

MATH 251 – Inquiry and Proof in 9-12 Mathematics   1 credit hour
This course is an introduction to the 9-12 mathematics curriculum with a focus on the role of mathematical inquiry and justification in the form of proof. Preservice teachers will be introduced to applications and the role of mathematical proofs in high school curriculum. Students will also engage in the process of mathematical inquiry leading to proof in a manner applicable to secondary teaching.
Prerequisite: MATH 115

MATH 260 – Calculus III   5 credit hours
A continuation of MATH 202. Vector calculus, partial derivatives and multiple integrals.
Department Consent Required
Prerequisite: MATH 202 or equivalent preparation

MATH 270 – Methods in Middle and High School Mathematics Teaching I   2 credit hours
In this initial methods course, preservice teachers develop a foundational understanding of pedagogy specific to 6-12 grade mathematics teaching. The topics investigated in the course include mathematics instructional methodology, research-based math teaching practices, mathematics standards, mathematics curricula, equitable structuring of middle and high school classrooms, and the essential concepts in middle and high school mathematics. In addition, preservice teachers cultivate a strong understanding of the historical and current trends in mathematics education. MATH 271, a co-requisite course, provides the opportunity to identify and put learning into practice.
Prerequisite: TE 100.
Corequisite: MATH 271.

MATH 271 – Field Experience in Middle and High School Mathematics I   1 credit hour
This 50 clock-hour mathematics specific field-based experience is designed to introduce students to classroom teaching. Under the mentorship of a practicing 6-12 mathematics teacher and the supervision of a UNK mathematics educator, preservice teachers will actively engage in the teaching of mathematics to 6-12 students.
Prerequisite: TE 100.
Corequisite: MATH 270.

MATH 280 – Linear Algebra   3 credit hours
Vector spaces, linear transformations, matrices, and determinants.
Prerequisite: MATH 115 or MATH 202 or MATH 260

MATH 300 – Tutoring in Mathematics   1 credit hour
This course provides opportunities for students to reflect on their experience in mathematics subject tutoring and meet the Experiential Learning requirement for degrees in mathematics. Concurrent employment as a Mathematics Subject Tutor in the Learning Commons (LC) within one of the first three semesters of tutoring employment with the LC is required for enrollment in this course.
Department Consent Required

MATH 305 – Differential Equations   3 credit hours
Methods of solution and applications of common types of differential equations.
Prerequisite: MATH 202

MATH 310 – College Geometry   3 credit hours
Mathematical systems and re-examination of Euclidean geometry from an advanced viewpoint.
Prerequisite: MATH 250

MATH 313 – Graph Theory   3 credit hours
An introductory course in Graph Theory. Topics will cover basic definitions and concepts of graph theory, distance, matchings, factors, connectivity, flows, cuts, and colorings. Characterization of graphs including trees, cycles, paths, planar graphs, chordal graphs, interval graphs, and random graphs will also be discussed. Finally, there will be discussion of probabilistic methods and an analysis of some classic algorithms.
Prerequisite: MATH 115 or MATH 123

MATH 330 – Math for Elementary Teachers II   3 credit hours
In this course, preservice teachers further develop knowledge of mathematics important for the effective teaching of grades 3-6 students. The mathematical topics investigated in the course include operations with integers and rational numbers, proportional reasoning, and advanced geometry and measurement concepts. In all of these topics, preservice teachers learn to develop appropriate mathematical explanations, understand student reasoning about mathematics, and communicate mathematical reasoning.
Prerequisite: MATH 230

MATH 350 – Abstract Algebra   3 credit hours
An introduction to modern algebra, including a brief study of groups, rings, integral domains and fields.
Prerequisite: MATH 250 or permission of instructor.

MATH 365 – Complex Analysis   3 credit hours
Complex analysis is an introduction to the theory of complex variables and the calculus of analytic functions. Topics covered include the calculus of residues, the Cauchy Integration theorem, and the extension of exponential, logarithmic, and trigonometric functions to the complex plane.
Prerequisite: MATH 260

MATH 385 – Introduction to Mathematical Research   1 credit hour
This course is an introduction to research in mathematics. The introduction is given through the process of finding and reading a research paper and identifying areas or questions that could be used in one's own research.
Prerequisite: MATH 250

MATH 390 – Research Experience in Mathematics   1 credit hour
This course provides opportunities for students to reflect on their experience in undergraduate research activities and meet the Experiential Learning requirement for degrees in mathematics. Concurrent participation in the Undergraduate Research Fellows program at UNK or recent participation in a similar research program such as Summer Student Research Program at UNK or Research Experiences for Undergraduates at any institution is required for enrollment in this course.
Total Credits Allowed: 4.00
Prerequisite: Acceptance to the Undergraduate Research Fellows program or department permission.

MATH 399 – Internship   1-4 credit hours
On the job experience designed to complement the major. Internship experiences are available only in selected areas. Consult with the departmental advisor. MATH 399 is a credit/no credit course.
Total Credits Allowed: 4.00

MATH 400 – History of Mathematics   3 credit hours
An introduction to the history of mathematics from its primitive origins to modern-day mathematics.
Prerequisite: MATH 115

MATH 404 – Theory of Numbers   3 credit hours
Properties of integers, congruencies, primitive roots, arithmetic functions, quadratic residues, and the sum of squares.
Prerequisite: MATH 250 or permission of instructor.

MATH 413 – Discrete Mathematics   3 credit hours
Topics include mathematical induction, recursion relations, counting principles, and discrete probability. Additional topics may include graph theory.
Prerequisite: MATH 250

MATH 420 – Numerical Analysis   3 credit hours
Principles of error analysis and accurate computation; rates of convergence, the solution of linear and nonlinear equations, interpolation and least squares, numerical integration, and numerical solution of differential equations.
Prerequisite: MATH 202 or permission of instructor

MATH 430 – Middle School Mathematics   3 credit hours
In this course preservice teachers develop knowledge of mathematics important for the effective teaching of grades 6-8 students. The mathematical topics investigated in the course include real numbers, foundational algebraic concepts, functions, exponents and roots, probability, statistics, Pythagorean Theorem, transformations, congruency and similarity. In all of these topics, preservice teachers learn to develop appropriate mathematical explanations, understand student reasoning about mathematics, and communicate mathematical reasoning. Topics will build on the foundations of MATH 230 and MATH 330 be focused toward the middle school math curriculum: algebraic structures including variables and functions, introductory number theory, probability, statistics, geometry, and problem solving.
Prerequisite: MATH 115 or MATH 202 or MATH 230 or MATH 260.

MATH 445 – Actuarial Science Seminar   1 credit hour
The purpose of this course is to develop knowledge of the fundamental probability tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized for the preparation of taking the exam P1. A thorough command of the supporting calculus is assumed, as well as exposure to many of the probability topics covered in STAT 441.
Prerequisite: STAT 441

MATH 460 – Advanced Calculus I   3 credit hours
Functions, sequences, limits, continuity, differentiation and integration.
Prerequisite: MATH 250 and MATH 202

MATH 465 – Advanced Study in 9-12 Mathematics   2 credit hours
This course is an in-depth study of the 9-12 mathematics curriculum with a focus on mathematical practices, essential understandings, and connections with advanced mathematics. Preservice teachers will strengthen their conceptual understanding of number theory, algebra, calculus, probability, and statistics concepts in the 9-12 curriculum. They will also work on communicating mathematical ideas to secondary students. Throughout the course they will draw connections between math concepts learned in 9-12 grades and advanced mathematical topics from undergraduate studies.
Prerequisite: MATH 350 and MATH 430

MATH 470 – Methods in Middle and High School Mathematics Teaching II   2 credit hours
In this second methods course, preservice teachers develop specialized research-based knowledge and instructional practices that facilitate mathematics learning for grades 6-12 students. The topics investigated in the course include mathematics research literature, differentiation, diversity and equity, assessment practices, and the development of effective mathematics lesson plans and curricular units. In addition, preservice teachers examine the importance of continuously improving teaching of mathematics through teacher reflection, instructional leadership, and professional development. MATH 471, a corequisite course, provides the opportunity to put learning into practice.
Prerequisite: MATH 270 and MATH 271 and TE 319 and TE 320 or TE 472 and TE 473.
Corequisite: MATH 471.

MATH 471 – Field Experience in Middle and High School Mathematics II   1 credit hour
This 50 clock-hour mathematics specific field-based experience is designed to provide students advanced practice in classroom teaching. Under the mentorship of a practicing 6-12 grade mathematics teacher and the supervision of a UNK mathematics educator, preservice teachers will actively engage in the teaching of mathematics to 6-12 grade students.
Prerequisite: MATH 270 and MATH 271 and TE 319 and TE 320 or TE 472 and TE 473.
Corequisite: MATH 470.

MATH 490 – Special Topics in Mathematics   1-3 credit hours
Topics chosen from the areas of mathematics appropriate to the student's program and will involve both formal lectures and independent study.
Total Credits Allowed: 3.00

MATH 495 – Independent Study in Mathematics   1-3 credit hours
An individual investigation by the student of topics not included in the normal mathematics offerings.
Department Consent Required
Total Credits Allowed: 5.00
Prerequisite: MATH 260

MATH 496 – Mathematics Seminar   1 credit hour
Topics not included in the normal mathematics offerings are presented by the students.
Prerequisite: MATH 260 or permission of instructor.