# MATHEMATICS

Mathematics is a diverse discipline that reveals hidden patterns and allows us to deepen our understanding of the world around us. The discipline of mathematics is constantly evolving, creating exciting new theories, addressing challenging problems, and finding solutions to problems in engineering, business, the sciences, and the social sciences. Mathematics deals with data, measurement, observation, inference, deduction, and proof.

Mathematicians create abstract models for real problems in order to find solutions to those problems. Mathematicians analyse data to make predictions about natural phenomena, human behavior and social systems.

## Who Studies Mathematics?

Students who are successful in studying mathematics will understand that mathematics is about adventure and learning and growing as they overcome challenges. Students who know mathematics can often see minuscule differences, allowing their attention to detail to cultivate an understanding of how each step of a problem progresses toward a solution rather that just memorizing these steps. Math students also often take a wider view that allows them to see the overall structure and find ways to make use of that structure to achieve their goals. Math students are curious and readily investigate ideas that may or may not work out. They seek logical understanding that only comes from fitting new ideas neatly into place with existing ones.

## Career Opportunities

Graduates will be well-prepared for any number of career paths where a strong applied mathematics education is required including:

- Biotechnology
- Engineering technology
- Clean energy
- Hydrogen and fuel cell technology
- Biomedical engineering
- Financial Analysis
- Econometrics
- Operations research
- Management science
- Decision Theory
- Mathematics Education

## Programs

- Bachelor of Science (Honours), Major in Applications of Mathematics (https://calendar.kpu.ca/programs-az/science/mathematics/mathematics-applications-bsh/)
- Bachelor of Science, Major in Applications of Mathematics (https://calendar.kpu.ca/programs-az/science/mathematics/mathematics-applications-bs/)
- Minor in Mathematics (https://calendar.kpu.ca/programs-az/science/mathematics/mathematics-minor/)
- Associate of Science Degree in Mathematics (https://calendar.kpu.ca/programs-az/science/mathematics/mathematics-as/)

## Courses

Visit the BC Transfer Guide - bctransferguide.ca (https://www.bctransferguide.ca/) - for information about course transfer in B.C.

**MATH 1102 3 credits**
**Precalculus Algebra**
Students will develop the computational skills and conceptual understanding of algebra, functions, and graphs necessary to proceed to more advanced mathematics thinking. They will study equations, inequalities, graphs, functions, right angle trigonometry, and applications to problem solving. Note: This is a Pathway Level 3 course option.
Level: UG
Prerequisite(s): Level E1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attribute: ASTR (https://calendar.kpu.ca/courses-az/#astrtext)

**MATH 1112 3 credits**
**Pre-Calculus**
Students will develop the conceptual understanding and computation skills that will provide a solid foundation for the study of calculus. They will study functions, their graphs, and their applications to problem solving. In particular they will study, polynomial, rational, exponential, logarithmic, trigonometric and inverse trigonometric functions. They will develop their ability to use and understand the concepts and language of mathematics. Note: This is a Pathway Level 3 course option.
Level: UG
Prerequisite(s): Level C1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1116 3 credits**
**Mathematical Explorations**
Students will study the structure and development of Mathematics from the point of view of the non-mathematician. They will study historical material on the development of classical mathematical ideas as well as the evolution and structure of more recent mathematics, gaining an appreciation of historical and contemporary mathematical thinking. This is an exploratory course in mathematics for students who have minimal mathematical background and whose major interests lie outside of the sciences. This course can be used to partially fulfill the quantitative requirement of the BA degree. It may not be used as a prerequisite for further Mathematics courses.
Level: UG
Prerequisite(s): Level E1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1117 3 credits**
**Environmental Mathematics**
Students will study algebraic concepts and methods, making use of them in general and environmental problem solving. They will study basic geometry and trigonometry, as well as functions (polynomial, rational, exponential, and logarithmic). Note: This is a Pathway Level 3 course option.
Level: UG
Prerequisite(s): Level E1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1120 3 credits**
**Differential Calculus**
Students will learn to differentiate algebraic and elementary transcendental functions and to apply these skills to graphing, maxima and minima, related rates, and rectilinear motion. They will be introduced to parametric curves and their differential calculus. Note: This is a Pathway Level 3 course option. This course is credit excluded with MATH 1130. Students may enroll in and earn credit for only one of these courses.
Level: UG
Prerequisite(s): Level A1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Credit Exclusion: MATH 1130
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1130 3 credits**
**Calculus for Life Sciences I**
Students will study differential calculus and its applications to biological sciences. In particular, they will study limits and differentiation of algebraic and elementary transcendental functions, with applications to graphing and optimization. Note: This is a Pathway Level 3 course option. This course is credit excluded with MATH 1120. Students may enroll in and earn credit for only one of these courses.
Level: UG
Prerequisite(s): Level B1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Credit Exclusion: MATH 1120
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1135 3 credits**
**Problems and Concepts**
Students will develop skills in solving mathematical problems. They will study propositional and quantifier logic and apply this knowledge to solving problems and to elementary set theory, including relations and functions.
Level: UG
Prerequisite(s): Level C1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1140 3 credits**
**Calculus I (Business Applications)**
Students will study the differentiation of algebraic and elementary transcendental functions and apply these skills to graphing, finding maxima and minima and solving problems in business, economics and social sciences. Students will also study first and second order partial derivatives. Note: This is a Pathway Level 3 course option.
Level: UG
Prerequisite(s): Level B1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1152 3 credits**
**Matrix Algebra for Engineers**
Students will solve systems of linear equations, and study the algebra of matrices, determinants, invertibility, eigenvalues and eigenvectors, diagonalizability and systems of linear Ordinary Differential Equations (ODE's). They will study the geometry of Euclidean space, dot and cross products, the arithmetic of complex numbers, exponentials of complex numbers, and the complex plane. Students will use a Computer Algebra System to solve problems in matrix algebra.
Level: UG
Prerequisite(s): One of: MATH 1120, MATH 1130 (C+), MATH 1140 (B-), MATH 1230, or MATH 1240
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1190 4 credits**
**Mathematics for Elementary School Teachers**
Students will study the theory and applications of arithmetic, geometry and data analysis (statistics). This course is designed for students planning a career as an elementary school teacher.
Level: UG
Prerequisite(s): Level E1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/), and 9 credits from courses at the 1100 level or higher.
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1216 3 credits**
**Mathematics in the Visual Arts**
Students will study the mathematical principles, methods, and structures used in the visual arts. They will study Euclidean and non-Euclidean geometry, symmetry, tilings in the plane, fractal geometry, and perspective. Note: this course may not be used as a prerequisite for further mathematics courses.
Level: UG
Prerequisite(s): Level E1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/).
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1220 3 credits**
**Integral Calculus**
Students will learn to integrate algebraic and elementary transcendental functions and to apply these skills to appropriate problems. In addition, they will learn the fundamental theorem of calculus, the integral calculus of parametric curves, Taylor polynomials, sequences and series and simple differential equations.
Level: UG
Prerequisite(s): MATH 1120, MATH 1130 (C+), or MATH 1140 (B-)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 1230 3 credits**
**Calculus for Life Sciences II**
Students will study integral calculus and its applications to biological sciences. In particular, they will study the techniques of integration, including integration by parts and partial fractions; differential equations, including systems of linear differential equations; and mathematical models in the biological sciences.
Level: UG
Prerequisite(s): MATH 1120, MATH 1130, or MATH 1140 (C+).
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2232 3 credits**
**Linear Algebra**
Students will study systems of linear equations, matrices, determinants, eigenvalues and eigenvectors, dot products, cross products, the Gram-Schmidt process, vector and scalar projections, lines and planes in Euclidean space. Students will also study vector spaces, including general vector spaces and subspaces, linear independence, spanning sets, bases, and linear transformations. Students will write simple proofs.
Level: UG
Prerequisite(s): MATH 1135 and one of MATH 1120 (C) or MATH 1130 (C+) or MATH 1140 (B-) or MATH 1220 (C) or MATH 1230 (C)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2321 3 credits**
**Multivariate Calculus (Calculus III)**
Students will study the calculus of three dimensions. They will study vectors, lines, planes, cylinders and surfaces; vector functions, space curves and motion in space; and differential and integral calculus of functions of several variables. Students will study optimization, including Lagrange Multipliers. They will study rectangular, polar, cylindrical and spherical coordinate systems. Students will study applied problems and use of a computer algebra system.
Level: UG
Prerequisite(s): One of: MATH 1220 (C), MATH 1230 (C+)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2331 3 credits**
**Introduction to Analysis**
Students will study the theory that underlies differential and integral calculus. In particular, they will study real numbers, limits of sequences, limits of functions, continuity, and will learn how to construct proofs involving these concepts.
Level: UG
Prerequisite(s): MATH 1135 and one of MATH 1220, MATH 1230 (C+), MATH 2232 or MATH 2410
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2410 3 credits**
**Discrete Mathematics**
Students learn about the basic techniques of discrete mathematics which is mainly the study of discrete objects like integers. Topics will include methods of formal logic, reasoning and proof techniques including induction, relations and functions and their properties, sequences and recursion, set theory and cardinality, modular arithmetic, counting principles and techniques, and the study of graphs representing relations.
Level: UG
Prerequisite(s): CPSC 1103 and one of the following: MATH 1120, MATH 1130 or MATH 1140
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2721 3 credits**
**Complex Numbers and Linear Algebra**
Students will use row reduction to solve systems of linear equations. They will study the algorithms for matrix multiplication, inversion, transposition, diagonalization, and computation of determinants, eigenvalues and eigenvectors, and apply these skills to practical problems. They will study the geometry of Euclidean spaces. They will study the arithmetic operations, exponentials and logarithms of complex numbers, and use them to solve a variety of applied problems in physics and engineering, including problems involving both ordinary and partial differential equations. Students will use a Computer Algebra System to solve problems in matrix algebra.
Level: UG
Prerequisite(s): MATH 1220 or MATH 1230 (C+)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 2821 3 credits**
**Multivariate and Vector Calculus**
Students will study the principles of multivariate and vector calculus. They will study surfaces, partial derivatives, gradients, and multiple integrals in polar, cylindrical, and spherical coordinate systems. Students will also study derivatives of single-variable vector-valued functions, partial derivatives and multiple integrals of multivariable real-valued functions, vector fields, differential operators, line integrals and Green's theorem, surface integrals, Stokes' and the Divergence theorems, conservative fields, and potentials, with an emphasis on applications.
Level: UG
Prerequisite(s): Either MATH 1220 or MATH 1230 (C+) and either MATH 2721 or MATH 1152
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3110 3 credits**
**Simulation Modeling**
Students will learn computer simulation and modeling techniques. They will learn simulation methodologies and techniques for random numbers and stochastic variate generation. They will also learn simulation design, analysis and estimation based on endogenously created data, simulation model validation and variance reduction. They will analyze and assess the sensitivity, applicability and limitations of each model. Students will implement simulation models for real-life applications using a computer programming language. This course is credit excluded with CPSC 3110. Students may enroll in and earn credit for only one of these courses.
Level: UG
Prerequisite(s): Both (a) STAT 2315, and (b) either CPSC 2302 or INFO 2315
Credit Exclusion: CPSC 3110
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3120 3 credits**
**Introduction to Applied Mathematics**
Students will learn a variety of techniques and methods useful in applied mathematics. They will study the gamma function and hyperbolic trigonometric functions. Students will investigate power series and Frobenius series methods for solving ordinary differential equations, including selected important differential equations in mathematical physics. Furthermore, they will study Sturm-Liouville problems and orthogonal series. A brief introduction to partial differential equations and separation of variables will be provided.
Level: UG
Prerequisite(s): All of (a) MATH 2321, (b) MATH 3421, and (c) either MATH 1152 or MATH 2232
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3130 3 credits**
**Introduction to the Mathematics Classroom**
Students will study and implement theories related to the teaching of mathematics. They will review and investigate current and past mathematics teaching practices. They will complete a project that integrates theory with practice and produce a portfolio of written work. Students will be required to apply theory through activities such as tutoring mathematics, assisting in a classroom, or developing curriculum materials. Note: EDUC 2220 (C) is recommended.
Level: UG
Prerequisite(s): Either: MATH 1220 or MATH 1230

**MATH 3140 3 credits**
**Mathematical Computing**
Students will design and implement MATLAB, Maple, and Python programs to solve problems from mathematics and the applications of mathematics. They will be introduced to mathematical word- processing with LaTeX. Students are required to have a portable computer able to run software as designated by the instructor.
Level: UG
Prerequisite(s): All of: (a) CPSC 1103 and MATH 2321; (b) MATH 1152 or 2232; and (c) one of STAT 1115, STAT 1170, STAT 2315, STAT 2335, or STAT 2342
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3150 3 credits**
**The Structure of Mathematics**
Students will study the underlying structure of mathematics, including mathematical symbolism, introduction to set theory and introduction to logic. They will develop an understanding of methods of proof and an appreciation for the structure of mathematics.
Level: UG
Prerequisite(s): MATH 2232 (C) and one of: MATH 1220 (C), MATH 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3160 3 credits**
**Group Theory**
Students will study the fundamental concepts and results of group theory. They will study groups, subgroups, normal subgroups, quotient groups, homomorphisms, Lagrange's theorem, the three isomorphism theorems, Cauchy's theorem, and direct products.
Level: UG
Prerequisite(s): MATH 2232 and one of the following: MATH 1220 or MATH 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3170 3 credits**
**Complex Variables**
Students will study complex numbers, functions of complex numbers, analytic functions, Cauchy-Riemann equations, elementary functions, contour integration, Cauchy's integral theorem and formula, series representations of analytic functions, poles and residues, with applications to physics and engineering.
Level: UG
Prerequisite(s): Both (a) MATH 1152, MATH 2232 or MATH 2721, and (b) MATH 2321 or MATH 2821
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3250 3 credits**
**Geometry**
Students will study Euclidean and other geometries, and construct geometrical proofs and objects. They will apply geometric concepts and reasoning to practical problems.
Level: UG
Prerequisite(s): MATH 2232 (C) and one of the following: MATH 1220 (C) or 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3322 3 credits**
**Vector Calculus (Calculus IV)**
Students will study the calculus of vector valued functions and vector fields. They will study derivatives of vector valued functions, the chain rule, Jacobians and invertibility, differential operators, line integrals and Green's theorem, surface integrals including divergence and Stokes' theorems, path independence and conservative fields and potentials.
Level: UG
Prerequisite(s): MATH 2321 (C) and one of: MATH 2232 (C), MATH 1152 (C)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3421 3 credits**
**Ordinary Differential Equations**
Students will study solving first order differential equations, second order linear differential equations with constant coefficients, Laplace transforms, systems of linear differential equations, and applications of differential equations. Students will also be using a computer algebra system.
Level: UG
Prerequisite(s): All of (a) MATH 2232 or MATH 1152 and (b) MATH 1220 or MATH 1230 (C+)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3431 3 credits**
**Partial Differential Equations**
Students will study the wave equation, the heat equation, Laplace's equation, and other classical equations of mathematical physics. They will study characteristic curves, solutions to the heat and wave equations on the infinite, semi-infinite and finite line, Fourier series, Laplace transforms, and numerical solutions using finite differences.
Level: UG
Prerequisite(s): MATH 3421
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 3450 3 credits**
**History of Mathematics**
Students will study aspects of the history of mathematics from its earliest beginnings in solving concrete problems through the development of abstraction and rigour in the nineteenth and early twentieth centuries. They will examine and analyse both the growth of ideas and the context in which they developed, with emphasis on the mathematics taught in secondary school and the first two years of university study.
Level: UG
Prerequisite(s): Either: MATH 1220 or MATH 1230
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4130 3 credits**
**Theory of Mathematics Education**
Students will explore theories and trends in mathematics education. They will survey significant historical, philosophical, psychological and societal factors influencing the development of mathematics education as a field of inquiry, and will critically examine and discuss current theories and research in mathematics instruction. They will investigate problem solving, reasoning and communication in mathematics. Note: EDUC 2220 is recommended.
Level: UG
Prerequisite(s): Either: MATH 1220 or MATH 1230

**MATH 4150 3 credits**
**Number Theory**
Students will study the following topics: divisibility, properties of types of integer numbers, primes, congruences, Diophantine equations, primitive roots, and quadratic residues.
Level: UG
Prerequisite(s): MATH 2232 (C) and one of: MATH 1220 (C), MATH 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4190 3 credits**
**Introduction to Point-Set Topology**
Students will study the fundamental concepts and results of point-set (general) topology. They will study sets, relations and functions, order, cardinality, Axiom of Choice, topological spaces, bases and subbases, continuity and homeomorphisms, metric spaces, countability and compactness.
Level: UG
Prerequisite(s): MATH 2232 (C) and MATH 2331 (C) and one of the following: MATH 1220 (C) or 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4210 3 credits**
**Biomathematics**
Students will study mathematical modelling and data analysis for biological systems. They will focus on developing and analysing dynamic models of biological systems and processes. They will study the mathematics of population dynamics, models of metabolic processes, genomics and epidemiology.
Level: UG
Prerequisite(s): MATH 3421 and STAT 2315
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4220 3 credits**
**Numerical Methods**
Students will study the theory and practical application of numerical methods for approximating solutions of linear and nonlinear problems. They will study solutions to nonlinear equations, interpolation and splines, numerical differentiation and integration, solution of initial and boundary value problems, and error sources and analysis. Students are required to have a portable computer able to run software as designated by the instructor.
Level: UG
Prerequisite(s): All of (a) one of: MATH 1220 or MATH 1230; (b) one of: MATH 2232, MATH 1152, or MATH 2721; and (c) one of: CPSC 1204 or MATH 3140
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4240 3 credits**
**Mathematical Modelling**
Students will study the formation, analysis, and interpretation of mathematical models drawn from the physical, biological, economic, and social sciences. They will study continuous and discrete, deterministic and stochastic models. Students will use techniques such as differential and difference equations, matrix analysis, optimization, simple stochastic processes, and numerical methods. Note: Students are required to have a portable computer able to run software as designated by the instructor.
Level: UG
Prerequisite(s): All of (a) MATH 2321, MATH 3421, and STAT 2315, and (b) either CPSC 1204 or MATH 3140
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4250 3 credits**
**Special Topics in Mathematics**
Students will study a particular advanced topic in mathematics, depending upon student interest and faculty availability. Note: Students may take this course multiple times for further credit on different topics.
Level: UG
Prerequisite(s): MATH 2232 and one of: MATH 1220 or MATH 1230 (C+)
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4280 3 credits**
**Graph Theory and Applications**
In this course, students will learn the foundations of graph theory, study its classical algorithms, and discover its applications in modeling real life problems. They will learn how sophisticated mathematical problems can be modeled and solved using graph theory and how, for example, shortest path algorithms find the shortest or the cheapest routes between locations of real-life networks. Classical problems like planarity, crossing numbers, spanning properties, chromatic number, independence, domination and matching, and their applications will be explored. Students will also learn about random and social networks and their properties and parameters. For example, they will understand why we live in a highly connected small world and what parameters influence our social structures and behaviours. Students become familiar with some of the leading network visualization and exploration software and tools.
Level: UG
Prerequisite(s): All of: (a) CPSC 1204; (b) MATH 2410; (c) either MATH 1152 or MATH 2232; and (d) one of STAT 1115, STAT 2315, STAT 2335, or STAT 2342
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**MATH 4350 3 credits**
**Senior Project**
Students will complete a substantial research project under the supervision of an instructor. They will identify relevant sources of information, in the form of a literature search and review, and submit a final paper investigating a research question. Students will present their project and research results.
Level: UG
Prerequisite(s): 9 credits from courses in MATH at the 3000 level or higher
Attribute: QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 1115 3 credits**
**Statistics I**
Students will summarize and display data and perform inferences about proportions, means and standard deviations for one and two populations. Students will summarize and display data, find confidence intervals, and perform hypothesis tests for proportions, means, and standard deviations, for one and two populations, both large and small. They will also perform regression analysis, and determine probabilities. This course is equivalent with MATH 1115. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): Level C1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 1170 3 credits**
**Introduction to Data Science: An AI Approach**
This course provides students with their initial exposure to the fundamental tools of data science, emphasizing the role of artificial intelligence in enhancing analytical capabilities. Applications span various disciplines—including social sciences, life sciences, physical sciences, business, and engineering. Participants will explore data manipulation, visualization, analysis, and interpretation using the Python programming language. The course integrates AI-driven methods into traditional data science workflows, covering foundational classification and regression models alongside advanced machine learning and deep learning techniques. Students will learn to forecast trends, recognize patterns, and leverage AI to automate complex analyses, all while engaging with real-world case studies that demonstrate the unified merging of AI and data science. Throughout the course, emphasis is placed on crafting compelling narratives that effectively translate AI-enhanced analytical results to non-technical audiences, ensuring practical understanding and real-world applicability. This course is equivalent with MATH 1170. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): Level C1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/)
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 2315 3 credits**
**Probability and Statistics**
Students will study introductory probability and statistics using a background of calculus. They will study concepts including randomness, probability, probability distributions for discrete and continuous random variables, descriptive statistics, multivariate distributions, laws of expectation, functions of random variables, statistical inference, and hypothesis testing. Distributions studied will include binominal, normal, geometric, hypergeometric, exponential and Poisson distributions. This course is equivalent with MATH 2315. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): MATH 1220 or MATH 1230
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 2335 3 credits**
**Statistics for Life Sciences**
Students will learn statistical techniques and their application to life sciences. They will study descriptive statistics, elementary probability, probability distributions, in particular, the binomial, normal, t and chi-square distributions, confidence intervals and hypothesis testing for population means, and proportions, as well as for differences in population means and proportions. Students will also study linear regression, and the chi-square goodness-of-fit test. This course is equivalent with STAT 2342, MATH 2335. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): MATH 1120, MATH 1130, or MATH 1140
Credit Exclusion: STAT 2342
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 2342 3 credits**
**Introduction to Statistics for Business**
Students will learn statistical techniques and their application to business and economics. They will study descriptive statistics, elementary probability, random variables, sampling distributions, linear regression, correlation, estimation and hypothesis testing. They will also learn how to apply statistical software to descriptive and inferential statistics. Distributions studied will include binominal, normal, t- and chi-square distributions. This course is equivalent with MATH 2341, MATH 2335. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): All of (a) Level C1 as defined in the Math Alternatives Table (https://calendar.kpu.ca/course-information/mathematics-alternatives-table/), and (b) 9 credits from courses at the 1100 level or higher
Credit Exclusion: STAT 2335
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)

**STAT 3315 3 credits**
**Applied Inferential Statistics**
Students will be introduced to the standard techniques of multiple regression analysis. They will study simple regression, ANOVA, multivariable distributions, analysis of residuals and general linear models and their role in research. This course is equivalent with MATH 3315. Students may earn credit for only one of these courses.
Level: UG
Prerequisite(s): 15 credits from courses at the 1100 level or higher, including one of the following: STAT 1115, STAT 2315, STAT 2335, or STAT 2342
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), QUAN (https://calendar.kpu.ca/courses-az/#quantext)