MATHEMATICS AND COMPUTER SCIENCE

Mathematics Program Description

The study of mathematics has occupied humans from ancient times to the present. It is an intellectual process requiring creativity, analysis, logic, decision-making, synthesis of ideas, and communication. Mathematics exists in and for itself but also provides the technical basis for problem-solving in a wide variety of fields. Saint Mary's graduates equipped with a strong mathematical background will be in the enviable position of being able to utilize their expertise in areas where rigorous thought and precision of results are necessary.

The courses in mathematics are offered for those studying the subject as part of a liberal education; for majors as a preparation for graduate studies, careers in business, or industry; and for those who intend to teach mathematics. In addition to the Major in Mathematics, we offer four tracks for those with special interests. The Statistical and Actuarial Mathematics Major is a sequence of courses giving the student experience in statistics with an emphasis on risk modeling and is recognized by the Society of Actuaries as a pre-actuarial program. The Computing and Applied Mathematics Major enables those students with a strong interest in computer science to pursue an integrated program of mathematics and computer science. Similarly, the Physics and Applied Mathematics Major enables those students with interests in physics and mathematics to pursue both. The Mathematics Major with Teacher Concentration enables the student to obtain secondary school certification in the State of Indiana.

Computer Science Program Description

Courses in computer science are designed to educate students of the liberal arts in computer literacy; to provide computer programming instruction for students of mathematics, science, business and social science; and to establish a solid foundation in computer software theory and practice for students of all disciplines. The College offers a major in Computing and Applied Mathematics that combines mathematics and computer science (see above), a concentration in Management Information Systems within the Business Administration major (see Business Administration and Economics), and a minor.

STUDY ABROAD

Saint Mary's has a long history of providing quality international programs as an essential part of our educational mission—forming women leaders who will make a difference in the world. As this world becomes increasingly interdependent, the College offers an expanding range of semester, year, semester break, and summer study and service programs in a wide variety of countries, and encourages students to take advantage of them. Learn more about the various Study Abroad opportunities (https://catalog.saintmarys.edu/undergraduate/academic-life/international-programs/).

For math majors, there is a unique opportunity to study abroad in the Budapest Semesters in Mathematics program. Students wishing to study abroad through this program may do so any semester or over the summer after they have completed either MATH 341 Analysis I or MATH 353 Abstract Algebra I (though exceptions have been made).

Teacher Preparation

The Department encourages students to prepare for teaching on all levels. Through the Teacher Concentration, courses are provided which enable mathematics majors to fulfill Indiana secondary teaching certification requirements. Students interested in secondary teaching should also complete a Secondary Education major (see Education). Elementary education students may take courses leading to a mathematics minor or a double major in mathematics and elementary education.

4+1 in Data Science

Any of the majors in mathematics and computer science can be combined with the Masters of Science in Data Science so that a student can complete the requirements for an undergraduate degree and the M.S. in Data Science in five years. Interested students should consult the director of the Data Science Program to develop a five-year plan. For the M.S. in Data Science program and course descriptions, see the M.S. in Data Science in the Graduate Studies section of the Bulletin.

Programs

- Computer Science, Minor CPSC (https://catalog.saintmarys.edu/ undergraduate/programs/mathematics-computer-science/computerscience-minor/)
- Computing and Applied Mathematics, Bachelor of Arts CAM (https://catalog.saintmarys.edu/undergraduate/programs/mathematics-computer-science/computing-applied-mathematics-bachelor-arts/)
- Computing and Applied Mathematics, Bachelor of Science -CAM (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/computing-applied-mathematics-bachelor-science/)
- Mathematics Teacher Concentration, Bachelor of Arts MATC (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/mathematics-teacher-concentration-bachelor-arts/)
- Mathematics Teacher Concentration, Bachelor of Science MATT (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/mathematics-teacher-concentration-bachelor-science/)
- Mathematics, Bachelor of Arts MATH (https:// catalog.saintmarys.edu/undergraduate/programs/mathematicscomputer-science/mathematics-bachelor-arts/)
- Mathematics, Bachelor of Science MATH (https:// catalog.saintmarys.edu/undergraduate/programs/mathematicscomputer-science/mathematics-bachelor-science/)
- Mathematics, Minor MATH (https://catalog.saintmarys.edu/ undergraduate/programs/mathematics-computer-science/ mathematics-minor/)
- Mathematics/Computer Science, Minor MTHC (https:// catalog.saintmarys.edu/undergraduate/programs/mathematicscomputer-science/mathematics-computer-science-minor/)
- Physics and Applied Mathematics, Bachelor of Arts PAM (https://catalog.saintmarys.edu/undergraduate/programs/mathematics-computer-science/physics-applied-mathematics-bachelor-arts/)
- Physics and Applied Mathematics, Bachelor of Science PAM (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/physics-applied-mathematics-bachelor-science/)

- Statistical and Actuarial Mathematics, Bachelor of Arts SAM (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/statistical-actuarial-mathematics-bachelor-arts/)
- Statistical and Actuarial Mathematics, Bachelor of Science -SAM (https://catalog.saintmarys.edu/undergraduate/programs/ mathematics-computer-science/statistical-actuarial-mathematics-bachelor-science/)

Continue at Saint Mary's

 Data Science, Master of Science (https://catalog.saintmarys.edu/ graduate/programs/data-science-master/)

Department Chair

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Faculty

Mathematics Faculty

S. Cox, C. Dwyer, C. Hoover, K. Kuter, E. Misiolek, P. Paranamana, C. Periton, M. Porter, R. Rohatgi, N. Salehi, B. Vajiac, C. Wedrychowicz

Computer Science Faculty

S. Cox, E. Misiolek, N. Salehi, C. Wedrychowicz

Student Learning Outcomes

- The graduate will demonstrate depth and breadth of knowledge of mathematical concepts, methods, reasoning, and language.
- The graduate will be able to engage in independent learning, application, and problem solving.
- The graduate will be able to communicate their ideas and the results of their work, both orally and in writing, with clarity and precision.
- The graduate will recognize the importance of social and ethical issues in professional settings.
- The graduate will be prepared for a career path that requires mathematical understanding.
- The graduate will be prepared to be a contributing member of a problem solving team.
- The graduate will utilize appropriate technology for analysis and problem solving.
- The graduate will have developed an appreciation for the power and beauty of mathematics.

Mathematics Courses

MATH 100 Problem-Solving Strategies in Mathematics (3)

Intensive study of the problem-solving process. Algebraic, patterning, modeling, and geometric strategies are explored. Includes a review of basic algebra skills and concepts necessary for problem solving. Consent of the Department is required. This does not fulfill the Mathematical Arts requirement of the Sophia Program.

MATH 102 Liberal Arts Mathematics (3)

Mathematical modeling through the use of graph theory. Topics include graphs, directed graphs, trees, matchings and network flows. Designed primarily for first year college students. Prerequisite: MATH 100 or recommendation of Math Placement Advisor.

MATH 103 Precalculus (3)

This course studies polynomial, rational, exponential, logarithmic, and trigonometric functions from the symbolic, numeric, and graphical perspectives. The emphasis on these concepts will provide solid preparation for a college-level calculus course. This does not fulfill the Mathematical Arts requirement of the Sophia Program. Prerequisite: recommendation of Math Placement Advisor.

MATH 104 Finite Mathematics (3)

Set theory, counting techniques, probability, random variables, expected value, variance, standard deviation, and linear programming. Prerequisite: MATH 102 or recommendation of Math Placement Advisor.

MATH 107 Mathematics for Sustainability (3)

This course develops and applies mathematical concepts and tools to quantitatively explore sustainability issues. Topics such as industrial agriculture, energy sustainability, population growth, and ecological footprints will be explored from environmental, social, and economic perspectives wherever possible. Mathematical concepts developed in the course are motivated through the study of these topics and allow students to survey several mathematical areas. Particular concepts covered include properties of real numbers, algebraic simplification of expressions, solving equations and inequalities, rates of change, interpretation of numerical information, functions and inverses, modeling, differentiation/integration, qualitative analysis of differential equation models, calculating probabilities, statistical techniques on real data, and graph paths and connectivity.

MATH 108 Elements of Linear Algebra (3)

Matrices, systems of equations, determinants, eigenvalues, linear transformations, vector spaces. Emphasis on applications. Prerequisite: MATH 104 or MATH 113.

MATH 110 Modern Geometries (3)

Finite geometries. Transformational geometry with an introduction to fractals. Euclidean geometry, including classical constructions. Non-Euclidean geometries, including hyperbolic and/or projective geometry. Prerequisite: MATH 104 or MATH 105.

MATH 113 Survey of Calculus (4)

A one semester introduction to differential and integral calculus designed primarily for liberal arts students and those in the professional programs. An emphasis on applications and modeling. Prerequisites: MATH 103 or recommendation of Math Placement Advisor.

MATH 114 Introduction to Statistics (3)

Introduction to basic sampling and experimental design. Basics of probability, random variables, and probability distributions. Sampling distributions. Estimation and hypothesis testing for means and proportions. Statistical software will be used. Prerequisite: MATH 104 or MATH 113 or equivalent.

MATH 118 Patterns in Mathematics for Elementary Teachers (3)

Problem solving and strategies; properties of whole numbers, integers, rational numbers, and real numbers; algorithms and computation; elementary number theory. The course follows the recommendations of the Mathematical Association of America and the National Council of Teachers of Mathematics for the training of elementary teachers. Prerequisite: One Mathematical Arts Sophia Program course.

MATH 131 Calculus I (4)

The first course in a two course sequence with MATH 132. The two courses will cover the following topics: algebraic and transcendental functions; limits; continuity; derivatives; maxima and minima; concavity; related rates; Taylor polynomials; Mean Value Theorem; anti-differentiation; Riemann sums; the Fundamental Theorem of Calculus; techniques of integration; sequences and series. The course is based on graphical, numerical, and symbolic points of view. Graphing calculators are used throughout the course. Prerequisite: MATH 103 with a grade of "C" or higher, or recommendation of Math Placement Advisor.

MATH 132 Calculus II (4)

The second course in a two course sequence with MATH 131. The two courses will cover the following topics: algebraic and transcendental functions; limits; continuity; derivatives; maxima and minima; concavity; related rates; Taylor polynomials; Mean Value Theorem; anti-differentiation; Riemann sums; the Fundamental Theorem of Calculus; techniques of integration; sequences and series. The course is based on graphical, numerical, and symbolic points of view. Graphing calculators are used throughout the course. Prerequisite: At least four years of high school mathematics, or recommendation of Math Placement Advisor. Prerequisite: MATH 131.

MATH 133 Theory and Application of Calculus (4)

This course is designed for students who have completed a full year of calculus in high school and have mastered the mechanics of differentiation and integration. The basic concepts of a two-semester college calculus sequence, including limits, derivatives, integrals, sequences and series, will be explored in depth. The emphasis of the course is on understanding the theory of calculus and constructing mathematical models. Prerequisite: A minimum score of 3 on the AP Calculus exam, recommendation of Math Placement Advisor, or permission of instructor.

MATH 180 Mathematics of Voting (1)

This course in applied math and politics will focus on the mathematics behind voting in both two-party and multi-party systems, comparing systems in the US with those in France and Ireland. Students will explore both implemented and theoretical social choice functions and analyze each, subject to standard criteria. They will develop an understanding for how formal rules and procedures have an impact on policy outcomes and informal institutions such as political parties.

MATH 211 Elementary Number Theory (3)

Basic number theoretic concepts are studied, with an emphasis on writing proofs. Divisibility; primes; Euclid's algorithm and its consequences; linear diophantine equations; residue classes; linear congruences; arithmetic functions. Applications of number theory to computer science (cryptography, complexity of computations). Prerequisite: MATH 118 or MATH 131.

MATH 225 Foundations of Higher Mathematics (3)

Set theory, logic, relations, functions, and an introduction to abstract mathematical structures, with an emphasis on reading and writing mathematical proofs. Prerequisite: MATH 132 or 133, or permission of instructor.

MATH 231 Calculus III (4)

Three-dimensional space: parametric equations, lines, planes, vectors, dot product, cross product. Polar coordinates. Vector-valued functions. Functions of several variables: partial derivatives, linear approximation, gradient, directional derivatives, maxima, minima, chain rule. Multiple ntegrals. Vector Calculus (including Green's Theorem and Stokes' Theorem). Prerequisite: MATH 132 or MATH 133.

MATH 241 Statistical Applications (3)

Sampling studies, design of experiments, hypothesis testing, analysis of variance, regression and correlation, regression modeling, time series. Introduction to operations research: queuing, systems analysis, quality assurance, acceptance sampling. Emphasis on applications to business and economic decision making. Prerequisite: MATH 114 with a grade of "C" or higher (also listed as BUAD 341).

MATH 251 Principles of Operations Research (3)

An introduction to Operations Research—quantitative models used in management decision-making. The course will focus on the models as tools with computer software used extensively for problem solving and assignments. Case studies are used. Prerequisite: One year of Calculus or MATH 114 (also listed as BUAD 427).

MATH 252 Financial Mathematics (3)

Mathematical theory of interest, annuities, amortization schedules, yield rates, and sinking funds. Prerequisite: Two semesters of calculus or equivalent or permission of the instructor.

MATH 272 Women and Mathematics: Seminar (3)

This course has three major components: an overview of the history of mathematics, the lives and contributions of selected women mathematicians throughout history, and the experiences of women in the contemporary mathematical community. In our general exploration of history, we focus on the development of mathematical ideas and the contributions made by various cultures and individuals. Among the historical figures studied in depth are Hypatia, Maria Agnesi, Sophie Germain, Sofia Kovaleskaia, Emmy Noether, Julia Robinson. The course will examine the ways in which the views of the modern mathematical community and the broader society discourage or encourage the participation of women and other under-represented groups in mathematics. Prerequisite: One semester of college-level calculus or equivalent.

MATH 302 Mathematics for Elementary School Teachers (3)

Review of basic properties of the real number system. Foundations of Euclidean geometry with additional study of transformational geometry. Elementary probability and statistics. This course meets for two hours of class instruction and has a two-hour laboratory component. Recommendations of MAA and NCTM are continued. Prerequisite: Two MATH courses including MATH 118 with a grade of C or higher in MATH 118.

MATH 326 Linear Algebra and Differential Equations (4)

Linear systems; linear independence; matrix algebra; determinants; vector spaces including subspaces, dimension, rank, change of bases; linear transformations; eigenvalues and eigenvectors; inner product; orthogonality; and Gram-Schmidt. An introduction to differential equations, including first order linear, separable, and exact; second order with constant coefficients and variation of parameters, reduction of order, and undetermined coefficients. Applications included. Prerequisites: MATH 231.

MATH 335 Differential Equations II (3)

A study of methods for solving higher order linear ordinary differential equations, linear first order systems, and boundary value problems for the heat and wave equations. Analysis of nonlinear systems of first order ordinary differential equations using approximation by linear systems, numerical solutions and phase portraits. The course will use mathematical software to solve differential equations and systems of differential equations symbolically, numerically and graphically. Prerequisite: MATH 326.

MATH 336 Numerical Analysis (3)

Computer arithmetic and algorithm convergence. Solutions of equations. Optimization. Numerical linear algebra. Numerical solutions to ordinary differential equations. Numerical differentiation and integration. Error analysis. Prerequisite or corequisite: MATH 326.

MATH 339 Discrete Mathematics (3)

Introduction to graph theoretic and combinatoric models: planar graphs; circuits; spanning trees; network flows; counting; generating functions; recurrence relations. Prerequisites: MATH 225 and CPSC 207.

MATH 341 Analysis I (3)

Construction of the reals; Sequences; Real valued functions of a single real variable: continuity, uniform continuity, sequences and series of functions, uniform convergence, differentiation, integration. Prerequisites: MATH 225 and MATH 231.

MATH 342 Analysis II (3)

Construction of the reals; Sequences; Real valued functions of a single real variable: continuity, uniform continuity, sequences and series of functions, uniform convergence, differentiation, integration. Prerequisite: MATH 341.

MATH 345 Probability (3)

A calculus-based approach to probability theory. Topics include probability spaces, classical theory, random variables, discrete and continuous distributions, multivariant distributions, transformations of random variables, random sampling, the law of large numbers, the central limit theorem and moment generating functions. Prerequisite: MATH 231 or equivalent.

MATH 346 Statistics (3)

Topics include sampling distributions, estimation, theory of estimators, test of hypotheses, analysis of variance, regression and correlation analysis, time series, experimental design, modeling and decision criteria. The use of statistical analysis in decision problems is stressed. Prerequisite: MATH 345 or equivalent.

MATH 353 Abstract Algebra I (3)

Basic algebraic systems: groups, rings, and fields. Homomorphisms and factor groups, rings. Polynomial rings and field extensions. Applications, including symmetry groups and algebraic coding theory. Prerequisite: MATH 225 and MATH 326.

MATH 354 Abstract Algebra II (3)

Basic algebraic systems: groups, rings, and fields. Homomorphisms and factor groups, rings. Polynomial rings and field extensions. Applications, including symmetry groups and algebraic coding theory. Prerequisite: MATH 353.

MATH 361 Geometry (3)

Historical and formal development of Euclidean and non-Euclidean geometries; role of axiom systems; congruence, parallelism, measurement. Prerequisite: MATH 225.

MATH 372 Stochastic Models (3)

Stochastic models of contingent payment, survival, frequency, severity and ruin. Compound distribution models. Emphasis on application to actuarial models. Prerequisite: MATH 345.

MATH 381 Mathematical Modeling (3)

In this course, students study the modeling process with application from difference equations, probability, dynamical systems, optimization, and simulation. Students will design, develop, implement, evaluate, and present mathematical models using real data for observable phenomena. Models and issues related to environmental and sustainability studies are emphasized. Prerequisites: MATH 326 and MATH 345.

MATH 388 BIG (Business, Industry, Government) Problems in Mathematics (3)

We focus on solving problems provided to us by partner organizations in business, industry, or government (BIG). Students develop their technical skills (mathematics, statistics, programming) as well as skills valued by employers of STEM professionals: teamwork, written and oral communication, independent problem solving, and meeting deadlines. This course is based on the PIC Math (Preparation for Industrial Careers in Mathematics) model developed by the Mathematical Association of America. Prerequisites: Math 231 and CPSC 207, or permission of instructor.

MATH 390 Special Topics (1-4)

Topics in Mathematics not covered in the regular department offerings. May be repeated with a different topic.

MATH 438 Mathematical Programming (3)

Topics include model building; classical optimization; linear programming; non-linear programming. Prerequisite: MATH 231, MATH 326 and junior or senior status.

MATH 490 Special Topics (1-3)

Topics in Mathematics not covered in the regular department offerings. May be repeated with a different topic.

MATH 496 Pro-Seminar (2)

Student presentation of selected topics. Prerequisite: Permission of the department chair.

MATH 497 Independent Study (1-3)

Provides properly qualified students with an opportunity for independent study and careful consideration from an advanced standpoint of selected topics in undergraduate mathematics. Prerequisite: Permission of the department chair. May be repeated.

MATH 499 Internship (1-3)

Professional work experience in mathematics or statistics with a business or organization. May be repeated.

Computer Science Courses

CPSC 102 Spreadsheets (1)

This course introduces the student to an integrated spreadsheet application. Topics covered include: cell formulas and built-in functions, formatting, charting, templates, "what-if" analysis, pivot tables, macros and integration of spreadsheet data into a word processor. Graded S/U.

CPSC 103 Introduction to Computing (2)

This course includes a brief history of computing, uses of computers in networking and programming, and ethical issues in computing. Students learn to use a database application as they create and manipulate tables, forms, queries, reports, macros and other database objects.

CPSC 207 Computer Programming (3)

This course explores program development and design with objects; the designs are implemented in a commonly used, current programming language. The emphasis is on designing, writing, and correcting programs. Topics include the internal organization of the computer, procedures and functions, elementary data structures, and techniques of problem solving. No previous experience with computers is required. The course is focused around a weekly two-hour laboratory and provides indepth programming experience.

CPSC 207L Computer Programming Laboratory (0)

A weekly two-hour laboratory and provides in-depth programming experience.

CPSC 210 Introduction to Data Science (3)

This course is about learning from data in order to gain useful predictions and insights. Using concepts from computer science, mathematics, and statistics, students will learn the necessary skills to manage and analyze data, including exploratory data analysis, statistical inference and modeling, and machine learning. Prerequisites: CPSC 207 (or equivalent) and one semester of calculus (MATH 113 or 131 or equivalent). Includes lab.

CPSC 210L Introduction Data Science Lab (0)

CPSC 307 C and Assembly Language Programming (3)

This course is designed to deepen a student's understanding of how a computer works by studying the C programming language and how it interfaces with assembly language. A weekly laboratory provides experience in controlling the behavior of the computer in ways not possible in higher level languages. Topics include computer organization, assemblers, loaders, link editors, and memory management. Prerequisite: CPSC 207 or equivalent.

CPSC 308 Electronic Communications (3)

This introduction to data communications examines the fundamentals of network architecture including layers, protocols, client/server model, file transfers, and other low-level communications issues. Students will experience hands-on internet related programming including web page development using HTML, and CSS. Prerequisites: CPSC 207 or permission of instructor. Includes a lab.

CPSC 308L Electronic Communications Lab (0)

Corequisite CPSC 308

CPSC 315 Simulation: Theory and Application (3)

Theory of computer simulation, including applications of discrete models of industrial and management systems. Topics include probability distributions, random number generation, queuing, design, and analysis of simulation experiments. Includes significant use of simulation software. Prerequisites: CPSC 207 and either MATH 114 or MATH 345.

CPSC 328 Data Structures (3)

This course introduces the concepts and techniques of structuring data for complex problems, and provides experience in accessing and processing this data. An object-oriented paradigm is used throughout the course. The course is designed especially for students who will choose a career in information technology. Prerequisite: CPSC 207. Includes a lab.

CPSC 328L Data Structures - Lab (0)

CPSC 390 Special Topics (3)

CPSC 417 Systems Analysis and Design (4)

This course includes a study of systems, particularly those which lend themselves to computer representation, a study of systems analysis and design, and the completion of a major systems project done in a team environment. The project will involve the analysis of an actual system problem, the writing of a system proposal to solve the problem, the presentation of the proposal to the users of the system, and the design and construction of a prototype to implement the proposal. Prerequisite: CPSC 207 or permission of instructor.

CPSC 417L Systems Analysis & Design lab (0)

CPSC 417 lab

CPSC 429 Database Systems (3)

Fundamental concepts of database development, in particular data modeling, database design, and database implementation, as well as managing, retrieving, and updating data within a relational database system. Hands-on experience includes use of the Structured Query Language (SQL) to define, construct, and query a database. Students complete a semester-long project done in a team environment. Prerequisite: CPSC 207 or permission of instructor.

CPSC 497 Independent Study (1-3)

Provides properly qualified students with an opportunity for independent study and careful consideration from an advanced standpoint of selected topics in computer science. Departmental approval required. May be repeated.

CPSC 499 Internship (1-3)

Professional work experience in computer science with a business or organization. Graded S/U. May be repeated.

Four-Year Plans in Mathematics and Computer Science Majors

The Mathematics and Computer Science Department offers five different majors:

- a. Computing and Applied Mathematics Even year start (p. 5) or Odd year start (p. 6),
- b. Mathematics Teacher Concentration Even year start (p. 7) or Odd year start (p. 8),
- c. Mathematics Even year start (p. 8) or Odd year start (p. 9),
- d. Physics and Applied Mathematics Even year start (p. 9) or Odd year start (p. 10),
- e. Statistical and Actuarial Mathematics Even year start (p. 11) or Odd year start (p. 11).

Recommended four-year plans are provided for each major. There are two plans provided for each major depending on whether the first year begins in an even or odd year. We emphasize that these plans are recommendations for a possible path to graduation as there exists flexibility in specific courses due to scheduling and elective choices. Course recommendations that may be altered regarding timing or selection are noted next to the course in the following plans. Students should contact Mandy Gair, agair@saintmarys.edu, to be assigned an advisor in the Department in order to develop an individualized four-year plan. Also note that any major can be completed as Bachelor of Arts (BA) or Bachelor of Science (BS) degree. There is no difference in the required CPSC, MATH, or PHYS courses for a given major between the BA or BS degree, but any student pursuing a BS will need to add science credits other than MATH or CPSC.

Computing & Applied Mathematics (CAM) – EVEN Year Start

Course

Credits

First Year

First Semester

Calculus I (Sophia Mathematical Arts) **MATH 131**

SPLL 101 First-Year Common Course

Sophia Language I (4cr)

CTS or W (3cr/4cr)

Sophia course (3	cr)		MATH 335	Differential Equations II (MATH 3xx elective	3
	Credits	4	or MATH 341	(3cr))	
Second Semeste	ır		or MATH 361	or Analysis I	
CPSC 207	Computer Programming (Sophia	3		or Geometry	
Professional Arts. Course			Sophia course (3		
	recommendations that may be altered)		Elective courses		
MATH 132	Calculus II	4		Credits	6
Sophia Language	e II (4cr)		Second Semeste	•	
CTS or W (3cr/4c	er)		MATH 496	Pro-Seminar (Course recommendations	2
Sophia course (3	cr)		MATHEORE	that may be altered)	0
	Credits	7	MATH 336 or MATH 342	Numerical Analysis (MATH 3xx elective (3cr))	3
Second Year			or MATH 345	or Analysis II	
First Semester				or Probability	
MATH 225	Foundations of Higher Mathematics	3	Elective courses	(10cr)	
	(Course recommendations that may be			Credits	5
N44 TU 001	altered)			Total Credits	49
MATH 231	Calculus III	4			
Sophia courses (0	- L. 184 1	
Sophia courses (oplied Mathematics (CAM) – ODD Year Start	
Elective course (<u>'</u>		Course	Title	Credits
	Credits	7	First Year First Semester		
Second Semeste				Calculus I (Caphia Mathematical Arts)	4
CPSC 328	Data Structures (Course recommendations that may be altered)	3	MATH 131	Calculus I (Sophia Mathematical Arts) ear Common Course	4
MATH 326	Linear Algebra and Differential Equations	4	Sophia Language		
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MATH 335	Differential Equations II (MATH 3xx elective	3	Sophia Language	e II (4cr)	
or MATH 353)		CTS or W (3cr/4c	er)	
or MATH 381	or Abstract Algebra I		Sophia course (3	cr)	
- 11	or Mathematical Modeling			Credits	7
Sophia course (4			Second Year		
Elective courses			First Semester		
	Credits	7	MATH 225	Foundations of Higher Mathematics	3
Second Semeste		-		(Course recommendations that may be	
CPSC 308	Electronic Communications	3		altered)	
or CPSC 315	or Simulation: Theory and Application Discrete Mathematics	2	MATH 231	Calculus III (Course recommendations that	4
MATH 339 Sophia course (3		3	0 1:	may be altered)	
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Elective courses	· ·	6	Sophia courses (
Fourth Year	Credits	0	Elective course (
				Credits	7
First Semester	Datahasa Systems (Course	2	Second Semeste		^
CPSC 429	Database Systems (Course recommendations that may be altered)	3	CPSC 308 or CPSC 315	Electronic Communications or Simulation: Theory and Application	3
			MATH 326	Linear Algebra and Differential Equations	1
			MATH 326	Discrete Mathematics (Course	3
			MICHIOS	recommendations that may be altered)	3

Credits 10 Cre	Sanhia agurea (2	or)		Second Semeste		
First Semester	Sophia course (3cr)					2
MATH 320	Elective course (CPSC 201	. 3 3	3
MATH 35	TI: 11/	Credits	10			
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Second Seminar (Course recommendations that may be altered) First Semester		Credits	7		· ·	
MATH 336	Second Semeste	r		MATH 231	Calculus III	4
Second Semester Second Se	CPSC 328	Data Structures	3	Sophia course (3	Ber)	
First Semester	MATH 336	Numerical Analysis (MATH 3xx elective	3	Sophia course (3	Ber)	
Sophia course (3cr)	or MATH 342	(3cr))		Elective course ((3cr)	
Second Semester MATH 326 Linear Algebra and Differential Equations A MATH 326 MATH 327 MATH 328	or MATH 345	· ·			Credits	7
A		·		Second Semeste	er	
Elective courses 6c				MATH 326	Linear Algebra and Differential Equations	4
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Fourth Year First Semester CPSC 429 Database Systems (Course recommendations that may be altered) Third Year MATH 335 or Differential Equations II (MATH 3xx elective or MATH 346 (3cr)) or MATH 346 (3cr) or MATH 351 or Abstract Algebra I or Mathematical Modeling Elective courses (10cr) Elective course (10cr) Elect		Credits	6	Sophia course (3	•	
First Semester	Fourth Year					
MATH 335	First Semester					
MATH 335 or MATH 346 (3cr)' or MATH 346 (3cr)' or MATH 346 (3cr)' or MATH 346 (3cr)' or MATH 346 or MATH 347 (3cr) or MATH 348 (3cr) or Mathematical Modeling MATH 346 (3cr) (3	CPSC 429	·	3		Credits	7
or MATH 346 or MATH 353 or Statistics First Semester MATH 346 or MATH 353 or Abstract Algebra I or Abstract Algebra I or Abstract Algebra I or MATH 363 or MATH 346	MATHOOF		0	Third Year		
or MATH 353 or Statistics MATH 346 Statistics 3 or MATH 381 or Abstract Algebra I or Abstract Algebra I or Mathematical Modeling Sophia course (4cr) \$\$\$\$\$ Abstract Algebra I 3 Elective courses (10 cr) Elective courses (6cr) MATH 339 Discrete Mathematics 3 Sophia course (3cr) Elective courses (3cr) Sophia course (3cr) Credits Sophia course (3cr) Credits 6 Credits Sophia course (3cr) Credits Sophia course (3cr) Credits Sophia course (3cr) Credits Sophia course (3cr) Sophia course (3cr) Credits Sophia cour			3	First Semester		
MATH 381 or Abstract Algebra I or Mathematical Modeling MATH 353 Abstract Algebra I 3 Sophia course (4cr) Sophia course (4cr) Elective courses (10 cr) Elective courses (6cr) Credits 6 Second Semester MATH 496 Pro-Seminar (Course recommendations that may be altered) 2 MATH 339 Discrete Mathematics 3 Sophia course (3cr) Abstract Algebra II (Course recommendations that may be altered) 3 Sophia course (3cr) Fiest Semester Fourth Year Fourth Year Fourth Year First Semester MATH 361 Geometry 3 3 Morth 361 Geometry 3 4 3 3				MATH 346	Statistics	3
Elective courses (10cr)	or MATH 381			MATH 353	Abstract Algebra I	3
Credits AMATH 339 Discrete Mathematics Discrete Mathematics MATH 339 Discrete Mathematics 3 Credits Credits Abstract Algebra II (Course recommendations that may be altered) Sophia course (3cr) Elective courses (10cr) Elective courses (6cr) Total Credits Abstract Algebra II (Course recommendations that may be altered) Sophia course (3cr) Elective courses (6cr) MATH 361 Decembers First Semester MATH 496 Pro-Seminar 2 MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits Forbits Courses (8cr) MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 Sophia Language I (4cr) Elective courses (16cr) Credits Credits <t< td=""><td></td><td>or Mathematical Modeling</td><td></td><td>Sophia course (4</td><td>ler)</td><td></td></t<>		or Mathematical Modeling		Sophia course (4	ler)	
NaTH 496 Pro-Seminar (Course recommendations that may be altered) MATH 339 Discrete Mathematics that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) Elective courses (6cr) Elective courses (6cr) MATH 496 Pro-Seminar MATH 361 Geometry 3 MATH 361 Geometry 3 MATH 361 Geometry 3 MATH 361 Geometry 3 MATH 496 Pro-Seminar 2 MATH 361 Geometry 3 MATH 496 Pro-Seminar 2 MATH 496 Pro-Seminar 3 MATH 496 Pro-Seminar 4	Elective courses	(10cr)		Elective courses	(6cr)	
MATH 496 Pro-Seminar (Course recommendations that may be altered) 3 MATH 339 Discrete Mathematics that may be altered) 3 Sophia course (3cr) MATH 339 Discrete Mathematics mecommendations that may be altered) 3 Elective courses (10cr) Sophia course (3cr) Credits 49 Credits Courth Year Mathematics Teacher Concentration (MATC/MATT) – EVEN Year Start First Semester MATH 361 Geometry 3 MATH 361 Geometry 5		Credits	6		Credits	6
that may be altered) MATH 354 Abstract Algebra II (Course recommendations that may be altered) 3 Elective courses (10cr) Sophia course (3cr) Elective courses (6cr) Elective courses (6cr) Credits 6 Mathematics Teacher Concentration (MATC/MATT) – EVEN Year Start First Semester First Semester MATH 361 Geometry 3 MATH 496 Pro-Seminar 2 First Semester Elective courses (8cr) MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) Credits 0 Credits 0 Credits 0 Sophia Language I (4cr) Elective courses (16cr) Credits 0 Correctits 1 Credits 0 Credits	Second Semeste	r		Second Semeste	er	
Sophia course (3cr) Elective courses (10cr) Credits Total Credits 49 Mathematics Teacher Concentration (MATC/MATT) – EVEN Year Start Course Title Credits First Year First Semester MATH 354 Abstract Algebra II (Course 3 recommendations that may be altered) Sophia course (3cr) Elective courses (6cr) Credits 6 Fourth Year First Semester MATH 361 Geometry 3 MATH 361 Geometry 3 MATH 361 Geometry 3 MATH 361 Pro-Seminar 2 Elective courses (3cr) Elective courses (3cr) Sophia course (3cr) Elective courses (8cr) MATH 361 Cedits 5 First Semester MATH 361 Geometry 3 MATH 361 Geometry 5 Elective courses (3cr) Elective courses (3cr) Elective courses (3cr) Elective courses (3cr) Elective courses (8cr) MATH 361 Geometry 3 MATH 361 Geometry 5 Elective courses (3cr) Elective courses (3cr) Elective courses (3cr) Elective courses (8cr) Total Credits 5 Credits 0 Total Credits 0 Total Credits 42	MATH 496	•	2	MATH 339	Discrete Mathematics	3
Sophia course (3cr) Elective courses (6cr) Elective courses (6cr)		· · · · · · · · · · · · · · · · · · ·		MATH 354	Abstract Algebra II (Course	3
Credits 2 Elective courses (6cr)					recommendations that may be altered)	
Total Credits 49 Credits 6	Elective courses	· ,		Sophia course (3	Ber)	
Fourth Year Mathematics Teacher Concentration (MATC/MATT) – EVEN Year First Semester Math 361 Geometry 3 Course Title Credits MATH 496 Pro-Seminar 2 First Year Sophia course (3cr) Elective courses (8cr) Second Semester SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42			2	Elective courses	(6cr)	
Mathematics Teacher Concentration (MATC/MATT) – EVEN Year Start First Semester MATH 361 Geometry 3 Course Title Credits MATH 496 Pro-Seminar 2 First Year Sophia course (3cr) MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Second Semester Credits 5 CTS or W (3cr/4cr) Elective courses (16cr) Credits 0 Sophia course (3cr) Total Credits 42		Total Credits	49		Credits	6
Start MATH 361 Geometry 3 Course Title Credits MATH 496 Pro-Seminar 2 First Year Sophia course (3cr) First Semester Elective courses (8cr) Credits 5 MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42				Fourth Year		
Start MATH 361 Geometry 3 Course Title Credits MATH 496 Pro-Seminar 2 First Year Sophia course (3cr) Elective courses (8cr) Second Semester 5 MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Second Semester Elective courses (16cr) Credits 0 CTS or W (3cr/4cr) Elective courses (16cr) Total Credits 42	Mathematics Te	acher Concentration (MATC/MATT) – EVEN	Year	First Semester		
First Year First Semester MATH 131 Calculus I (Sophia Mathematical Arts) SPLL 101 First-Year Common Course Sophia Language I (4cr) CTS or W (3cr/4cr) Sophia course (3cr) Second Semester Elective courses (16cr) Credits O Total Credits 42		,		MATH 361	Geometry	3
First Semester MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42	Course	Title	Credits	MATH 496	Pro-Seminar	2
MATH 131 Calculus I (Sophia Mathematical Arts) 4 Credits 5 SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42	First Year			Sophia course (3	Ber)	
SPLL 101 First-Year Common Course Second Semester Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42	First Semester			Elective courses	(8cr)	
Sophia Language I (4cr) Elective courses (16cr) CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42	MATH 131	Calculus I (Sophia Mathematical Arts)	4		Credits	5
CTS or W (3cr/4cr) Credits 0 Sophia course (3cr) Total Credits 42	SPLL 101 First-Year Common Course Sec			Second Semester		
Sophia course (3cr) Total Credits 42	Sophia Language I (4cr)			Elective courses	(16cr)	
	CTS or W (3cr/4c	CTS or W (3cr/4cr)			Credits	0
Credits 4	Sophia course (3	cr)			Total Credits	42
		Credits	4			

			WATTI 430	1 10-Serriiriai
M.Ab		V	Sophia course (3	Bcr)
Matnematics 16 Start	eacher Concentration (MATC/MATT) – ODD	Year	Elective courses	(5cr)
Course	Title	Credits		Credits
First Year		Orcuito	Second Semeste	er
First Semester			Elective courses	(16cr)
MATH 131	Calculus I (Sophia Mathematical Arts)	4		Credits
	ear Common Course			Total Credits
Sophia Languag				
CTS or W (3cr/4c	• •		Madhama'a (1	AATUV EVENIVAAR
Sophia course (3			Mathematics (N	MATH) – EVEN Year S
copina course (c	Credits	4	First Year	Title
Second Semeste		•		
CPSC 207	Computer Programming (Sophia	3	First Semester	Calculus I (Caphia N
CP3C 201	Professional Arts. Course	3	MATH 131	Calculus I (Sophia N
	recommendations that may be altered)		SPLL 101 (1cr)	1/4
MATH 132	Calculus II	4	Sophia Languag	
Sophia Languag	e II (4cr)		CTS or W (3cr/4e	
CTS or W (3cr/4d			Sophia course (3	
Sophia course (3				Credits
	Credits	7	Second Semeste	
Second Year	o.ca.i.c	•	CPSC 207	Computer Programm
First Semester				Professional Arts. C recommendations to
MATH 225	Foundations of Higher Mathematics	3	MATH 132	Calculus II
MATH 231	Calculus III	4	Sophia Languag	
Sophia course (3			CTS or W (3cr/4	
Sophia course (3			Sophia course (3	
Elective course (Soprila course (c	Credits
Licetive course (Credits	7	Second Year	Credits
Second Semeste		,		
MATH 326	Linear Algebra and Differential Equations	4	First Semester	Farm dations of High
MATH 320	Discrete Mathematics	3	MATH 225	Foundations of High (Course recommend
Sophia course (3		3		altered)
			MATH 231	Calculus III
Sophia course (3			Sophia courses	(6cr)
Elective course (· /		Elective course (
This IV.	Credits	7		Credits
Third Year			Second Semeste	
First Semester			MATH 326	Linear Algebra and I
MATH 341	Analysis I	3	MATH 345	Probability (Course
MATH 361	Geometry	3	WATH 343	may be altered)
Sophia course (4	•		Sophia courses	
Elective courses	· ,		Elective course (
	Credits	6	Elective course (Credits
Second Semeste	er		Third Year	Ciedits
MATH 345	Probability	3	First Semester	
Sophia course (3	Ber)		MATH 346	Statistics (Course re
Elective courses	(9cr)		WATE 340	may be altered)
	Credits	3	MATH 353	Abstract Algebra I (
Fourth Year			.717 (111 000	recommendations the
First Semester			Sophia course (4	
MATH 346	Statistics	3	Elective courses	
MATH 353	Abstract Algebra I	3		Credits
				OTEUILO

MATH 496	Pro-Seminar	2
Sophia course (3		2
Elective courses		
Licotive doubted	Credits	8
Second Semeste	0.04.10	Ū
Elective courses		
	Credits	0
	Total Credits	42
	Total orealts	72
	MATH) - EVEN Year Start	ماناه
Course	Title	Credits
First Year		
First Semester MATH 131	Calculus I (Saphia Mathematical Arts)	4
	Calculus I (Sophia Mathematical Arts)	4
SPLL 101 (1cr)	a L (4ar)	
Sophia Languag CTS or W (3cr/4c		
Sophia course (3		
Soprila course (3	Credits	4
Second Semeste		4
CPSC 207	Computer Programming (Sophia	3
CF3C 201	Professional Arts. Course	3
	recommendations that may be altered.)	
MATH 132	Calculus II	4
Sophia Languag	e II (4cr)	
CTS or W (3cr/4e	er)	
Sophia course (3	Ber)	
	Credits	7
Second Year		
First Semester		
MATH 225	Foundations of Higher Mathematics	3
	(Course recommendations that may be	
	altered)	
MATH 231	Calculus III	4
Sophia courses	` ,	
Elective course (,	
Second Semeste	Credits	7
		4
MATH 326 MATH 345	Linear Algebra and Differential Equations	4
MATH 345	Probability (Course recommendations that may be altered)	3
Sophia courses	•	
Elective course (,	
	Credits	7
Third Year		-
First Semester		
MATH 346	Statistics (Course recommendations that may be altered)	3
MATH 353	Abstract Algebra I (Course	3
	recommendations that may be altered)	3
Sophia course (4		
Elective courses		
	Credits	6

Second Semeste	ſ	
MATH 354	Abstract Algebra II (Course	3
	recommendations that may be altered)	
MATH 339	Discrete Mathematics (MATH 3xx elective.	3
or MATH 372	Course recommendations that may be	
	altered.) or Stochastic Models	
Sophia course (3		
Elective courses		
Licetive courses	Credits	6
Fourth Year	oreans	O
First Semester		
MATH 341	Analysis I (Course recommendations that	3
WATTIOTI	may be altered)	3
MATH 496	Pro-Seminar (Course recommendations	2
	that may be altered)	
Sophia course (3	cr)	
Elective courses	(8cr)	
	Credits	5
Second Semeste	r	
Elective courses	(16cr)	
	Credits	0
	Total Credits	42
Mathematics (M	IATH) – ODD Year Start	
_	•	
	Title	Credits
First Year	•	Credits
First Year First Semester	Title	Credits
First Year First Semester	Title Calculus I (Sophia Mathematical Arts)	4
First Year First Semester MATH 131	Title Calculus I (Sophia Mathematical Arts) Credits	Credits 4
Course First Year First Semester MATH 131 Second Semeste	Title Calculus I (Sophia Mathematical Arts) Credits	4
First Year First Semester MATH 131 Second Semeste	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia	4
First Year First Semester MATH 131 Second Semeste	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course	4
First Year First Semester MATH 131 Second Semester CPSC 207	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II	4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II Ell (4cr)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II E II (4cr) r)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr/4c)	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II E II (4cr) r)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr/4c) Second Year	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr)	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3c) Second Year First Semester	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) Credits	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3c) Second Year First Semester	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II E II (4cr) r) Credits Foundations of Higher Mathematics	4 4 3
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3c) Second Year First Semester	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II E II (4cr) r) Credits Foundations of Higher Mathematics (Course recommendations that may be	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr/4c) Second Year First Semester MATH 225	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II Ell (4cr) r) Credits Foundations of Higher Mathematics (Course recommendations that may be altered)	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr) Second Year First Semester MATH 225	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr) Second Year First Semester MATH 225 MATH 231 Sophia courses (4cr)	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III Calculus III Course recommendations that may be altered) Calculus III Calculus III	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr) Second Year First Semester MATH 225 MATH 231 Sophia courses (4cr)	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II Ell (4cr) r) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III Gor) Calculus III Calculus III	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr) Second Year First Semester MATH 225 MATH 231 Sophia courses (3cr) Sophia courses (3cr) Second Year MATH 231 Sophia courses (3cr)	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II Ell (4cr) T) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III 6cr) 3cr) Credits	4 4 3 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr) Second Year First Semester MATH 225 MATH 231 Sophia courses (3cr) MATH 231 Sophia courses (3cr) Second Semester Second Semester	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III 6cr) 3cr) Credits	4 4 3 4 7
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3c) Second Year First Semester MATH 225 MATH 231 Sophia courses (in the second Semester) MATH 231 Sophia courses (in the second Semester) MATH 326	Calculus I (Sophia Mathematical Arts) Credits Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II Ell (4cr) T) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III Gor) Calculus III Gor) Credits Credits T Linear Algebra and Differential Equations	7 3 4 7 4
First Year First Semester MATH 131 Second Semester CPSC 207 MATH 132 Sophia Language CTS or W (3cr/4c Sophia course (3cr/4c) Second Year	Calculus I (Sophia Mathematical Arts) Credits r Computer Programming (Sophia Professional Arts. Course recommendations that may be altered) Calculus II e II (4cr) r) cr) Credits Foundations of Higher Mathematics (Course recommendations that may be altered) Calculus III 6cr) 3cr) Credits	4 4 3 4 7

Elective course (3cr)	
	Credits	7
Third Year		
First Semester		
MATH 341	Analysis I (Course recommendations that may be altered)	3
MATH 346	Statistics (Course recommendations that may be altered)	3
Sophia course (4	cr)	
Elective courses	(6cr)	
	Credits	6
Second Semeste	r	
MATH 342	Analysis II (Course recommendations that may be altered)	3
MATH 336 or CPSC 315 or CPSC 328	Numerical Analysis (MATH or CPSC 3xx elective (3cr) Course recommendations that may be altered) or Simulation: Theory and Application or Data Structures	3
Sophia course (3	cr)	
Elective courses	(6cr)	
	Credits	6
Fourth Year		
First Semester		
MATH 353	Abstract Algebra I (Course recommendations that may be altered)	3
MATH 496	Pro-Seminar (Course recommendations that may be altered)	2
Sophia course (3	cr)	
Elective courses	(8cr)	
	Credits	5
Second Semeste	r	
Elective courses	(16cr)	
	Credits	0
	Total Credits	42
	ed Mathematics (PAM) – EVEN Year Start	Cradite

Physics & Applied Mathematics (PAM) – EVEN Year Start					
Course	Title	Credits			
First Year					
First Semester					
MATH 131	Calculus I (Sophia Mathematical Arts)	4			
PHYS 121	General Physics I: Mechanics and Waves (Sophia Natural Science I)	4			
Sophia Language	I (4cr)				
CTS or W (3cr/4cr	r)				
SPLL 101 (1cr)					
	Credits	8			
Second Semester	r				
MATH 132	Calculus II	4			
PHYS 122	General Physics II: Temperature, Electricity, and Light (Sophia Natural Science I)	4			
Sophia Language II (4cr)					

CTS or W (3cr/4c	er)		Elective courses	s (14cr)	
	Credits	8		Credits	2
Second Year First Semester				Total Credits	54
CPSC 207	Computer Programming (Sophia Professional Arts.Course recommendations that may be altered)	3	Course	ied Mathematics (PAM) – ODD Year Start Title	Credits
MATH 225	Foundations of Higher Mathematics (Course recommendations that may be altered)	3	First Year First Semester MATH 131	Calculus I (Sophia Mathematical Arts)	4
MATH 231	Calculus III	4	PHYS 121	General Physics I: Mechanics and Waves	4
PHYS 253	General Physics III: Modern Physics	3		(Sophia Natural Science I: (4cr))	
Sophia course (3	cr)		Sophia Languag	e I (4cr)	
	Credits	13	CTS or W (3cr/4	cr)	
Second Semeste	er		SPLL 101 (1cr)		
MATH 326	Linear Algebra and Differential Equations	4		Credits	8
MATH 345	Probability (Course recommendations that	3	Second Semeste		
DLIVE 2021	may be altered)	1	MATH 132	Calculus II	4
PHYS 292L	Wave Mechanics Laboratory (Course recommendations that may be altered)	1	PHYS 122	General Physics II: Temperature, Electricity, and Light (Sophia Natural Science I: (4cr))	4
PHYS 323	Classical Mechanics (PHYS elective.	3	Sophia Languag	e II (4cr)	
	Course recommendations that may be		CTS or W (3cr/4	cr)	
Sophia courses (altered)			Credits	8
Soprila courses (Credits	11	Second Year		
Third Year	Gredits		First Semester		
First Semester			CPSC 207	Computer Programming (Sophia Professional Arts. Course	3
MATH 346	Statistics (Course recommendations that may be altered)	3	MATH 225	recommendations that may be altered) Foundations of Higher Mathematics	3
PHYS 424	Quantum Mechanics (Course recommendations that may be altered)	3		(Course recommendations that may be altered)	
Sophia course (3	cr)		MATH 231	Calculus III	4
Elective courses	(6cr)		PHYS 253	General Physics III: Modern Physics	3
	Credits	6	Sophia course (3	Bcr)	
Second Semeste	er			Credits	13
PHYS 323	Classical Mechanics (Course	3	Second Semeste	er	
	recommendations that may be altered)		MATH 326	Linear Algebra and Differential Equations	4
Sophia course (3 Elective courses			MATH 345	Probability (Course recommendations that may be altered)	3
	Credits	3	PHYS 323	Classical Mechanics (Course	3
Fourth Year				recommendations that may be altered)	
First Semester			Sophia courses		
MATH 335	Differential Equations II (MATH 3xx	3		Credits	10
or MATH 341	elective. Course recommendations that		Third Year		
	may be altered) or Analysis I		First Semester		
Sophia course (3	·		MATH 346	Statistics (Course recommendations that may be altered)	3
Elective courses	(10cr)		PHYS 282L	Modern Experimental Laboratory (Course	1
	Credits	3		recommendations that may be altered)	
Second Semeste MATH 496	Pro-Seminar (Course recommendations	2	PHYS 444	Electricity and Magnetism (Course recommendations that may be altered)	3
	that may be altered)		Sophia course (3cr)		
			Elective courses	(6cr)	
				Credits	7

Second Semeste	er		Second Semeste	er	
MATH 336	Numerical Analysis (MATH or CPSC 3xx	3	MATH 326	Linear Algebra and Differential Equations	4
or CPSC 315	elective. Course recommendations that		MATH 345	Probability	3
or CPSC 328	may be altered)		Sophia courses (· · · · · · · · · · · · · · · · · · ·	
	or Simulation: Theory and Application		Elective course (
DLIVO 202	or Data Structures	2		Credits	7
PHYS 323	Classical Mechanics (PHYS elective. Course recommendations that may be	3	Third Year		
	altered)		First Semester		
Sophia course (3	,		MATH 346	Statistics	3
Elective courses			MATH 353	Abstract Algebra I (Course	3
	Credits	6		recommendations that may be altered)	
Fourth Year			Sophia course (4	er)	
First Semester			Elective courses	(6cr)	
Sophia course (3	Ber)			Credits	6
Elective courses	(13cr)		Second Semeste	er	
Second Semeste	Credits	0	MATH 354	Abstract Algebra II (Course recommendations that may be altered)	3
MATH 496	Pro-Seminar (Course recommendations	2	MATH 372	Stochastic Models	3
WIA 111 4430	that may be altered)	۷	Sophia course (3	er)	
Elective courses	·		Elective courses	(6cr)	
	Credits	2		Credits	6
	Total Credits	54	Fourth Year		
			First Semester		
			MATH 335	Differential Equations II (MATH 3xx	3
	tuarial Mathematics (SAM) – EVEN Year Start		or MATH 341	elective. Course recommendations that	
Course	Title	Credits	or MATH 361	may be altered)	
First Year				or Analysis I or Geometry	
First Semester			MATH 496	Pro-Seminar (Course recommendations	2
MATH 131	Calculus I (Sophia Mathematical Arts)	4	1411/11/130	that may be altered)	_
SPLL 101 (1cr)	- 1 (4 - 2		Sophia course (3	scr)	
Sophia Language	• •		Elective courses	(8cr)	
CTS or W (3cr/4c				Credits	5
Sophia course (3			Second Semeste	er	
0	Credits	4	MATH 252	Financial Mathematics (Course	3
Second Semeste		2		recommendations that may be altered)	
CPSC 207	Computer Programming (Sophia Professional Arts. Course	3	Elective courses	(16cr)	
	recommendations that may be altered)			Credits	3
MATH 132	Calculus II	4		Total Credits	45
Sophia Language	e II (4cr)				
CTS or W (3cr/4c			Statistical & Ac	tuarial Mathematics (SAM) – ODD Year Sta	art
Sophia course (3	•		Course	Title	Credits
	Credits	7	First Year	Title	orcuito
Second Year			First Semester		
First Semester			MATH 131	Calculus I (Sophia Mathematical Arts)	4
MATH 225	Foundations of Higher Mathematics	3	SPLL 101 (1cr)	(Copina matternation / itto)	
	(Course recommendations that may be		Sophia Language	e I (4cr)	
	altered)		CTS or W (3cr/4c		
MATH 231	Calculus III	4	Sophia course (3		
Sophia courses ((6cr)		30pina 00ai3e (3	Credits	4
Elective course (3cr)			orcuito	-
	Credits	7			

Second Semeste	r	
CPSC 207	Computer Programming (Sophia	3
	Professional Arts. Course	
	recommendations that may be altered)	
MATH 132	Calculus II	4
Sophia Language	• •	
CTS or W (3cr/4c		
Sophia course (3		
	Credits	7
Second Year		
First Semester	- 12 6001 4401 2	
MATH 225	Foundations of Higher Mathematics (Course recommendations that may be	3
	altered)	
MATH 231	Calculus III	4
Sophia courses (6cr)	
Elective course (3	Ber)	
	Credits	7
Second Semeste	r	
MATH 326	Linear Algebra and Differential Equations	4
MATH 345	Probability (Course recommendations that	3
	may be altered)	
Sophia courses (6cr)	
Elective course (3	Ber)	
	Credits	7
Third Year		
First Semester		
MATH 341	Analysis I (Course recommendations that may be altered)	3
MATH 346	Statistics (Course recommendations that may be altered)	3
Sophia course (4	cr)	
Elective courses	(6cr)	
	Credits	6
Second Semeste		
MATH 252	Financial Mathematics	3
MATH 342	Analysis II (Course recommendations that	3
Caphia aguras (2	may be altered)	
Sophia course (3		
Elective courses	Credits	
Fourth Year	Ciedita	6
First Semester		
MATH 335	Differential Equations II (MATH 3xx	3
or MATH 353	elective. Course recommendations that	J
or MATH 381	may be altered)	
	or Abstract Algebra I	
	or Mathematical Modeling	
MATH 496	Pro-Seminar (Course recommendations that may be altered)	2
Sophia course (3	·	
Elective courses		
	Credits	5
	o. caito	J

Second Semester

MATH 372	Stochastic Models	3
Elective courses (16cr)	
	Credits	3
	Total Credits	45