MATH DEPARTMENT
Utica Center for Science and Math
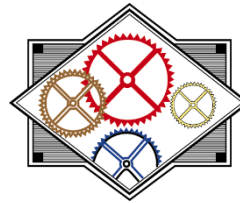

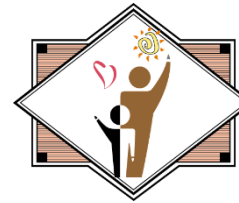Arts & Communications | Business, Management Marketing & Technology | Health Science | Engineering/Manufacturing & Industrial Technology | Human Services | Natural Resources & Agriscience

VPAA – Meets Visual, Performing & Applied Arts Requirement
OLE – Partially Meets Online Learning Experience Requirement
GR/MMC – Meets Graduation Requirements based on Michigan Merit Curriculum
SMR – Senior Math Related

ADVANCED ALGEBRA/GEOMETRY (UCMST) (GR/MMC) – E800   9   1.0 credit
PREREQUISITE: Acceptance into the UCMST program and successful completion of Algebra I

Advanced Algebra/Geometry is designed to develop understanding of advanced mathematical topics such as mathematical modeling, rational expressions, an analysis of absolute value expressions, radicals and rational exponents, matrices, n-dimensional systems of equations, and Euclidean Geometry.

ADVANCED ALGEBRA/INTRO TO DISCRETE MATHEMATICS (UCMST) (GR/MME) – E805B.1   9   1.0 credit
PREREQUISITE: Acceptance into the UCMST program and successful completion of Algebra I and Geometry

Advanced Algebra/Intro to Discrete Mathematics contains topics found in Advanced Algebra and Discrete Mathematics. The course is designed to develop understanding of advanced mathematical topics such as mathematical modeling, rational expressions, an analysis of absolute value expressions, radicals and rational exponents, matrices, and n-dimensional systems of equations. Topics in Discrete Mathematics include, but are not limited to, matrix applications, advanced counting & probability, logic, set theory, introduction to graph theory, and recursion.

ADVANCED PLACEMENT COMPUTER SCIENCE (OLE) (GR/MMC) (SMR) – E215   9   1.0 credit

Advanced Placement Computer Science A is an introduction to Object-Oriented computer programming using a high-level programming language such as Java. The course will emphasize program structure and design while developing standard programming algorithms and conventional procedures. Classes, member functions, inheritance, polymorphism, operator overloading, sorting routines, and the Advanced Placement Case study will be covered in this course.

MATHEMATICAL ANALYSIS (UCMST) (GR/MMC) – E810   10   1.0 credit

PREREQUISITE: Successful completion of Advanced Algebra/Geometry or Advanced Algebra/Intro to Discrete Mathematics

Analysis is designed to develop an in-depth understanding of functions, including power, polynomial, rational, exponential, logarithmic, and trigonometric functions. Units on conic sections and vectors are also included.

FOUNDATIONS of CALCULUS (UCMST) (GR/MME) – E820A.2   11   0.5 credit

PREREQUISITE: Successful completion of Mathematical Analysis

Foundations of Calculus are designed to provide theoretical foundations for the study of higher mathematics and computer science. Students study sequences and series, probability, n-dimensional vectors, parametric and polar equations, logic and proofs, limit theory, and differential calculus.

ADVANCED PLACEMENT STATISTICS (GR/MME) – E835BAP.1   11   0.5 credit

PREREQUISITE: Successful completion of Mathematical Analysis and Foundations of Calculus

Advanced Placement Statistics is the study of topics in mathematics which can be grouped into four categories:

Experimental Design: Students will design appropriate experiments in order to draw conclusions that can be generalized to the population of interest. Students will also interpret studies and experiments to determine whether the conclusions from the studies warrant consideration.

Exploring Data: Students will collect and examine data; displaying the patterns that emerge. Data from students in class as well as real world data sets will be gathered and used to illustrate concepts.

Producing Models Using Probability and Simulation: Students will learn to anticipate patterns and produce models for prediction. Students will use simulations to model situations that are not practical to replicate using other methods.

Statistical Inference: Students will learn what can be generalized about the population. Students will also consider how to investigate research questions, design a study, and interpret the results.

Students use computers and graphing calculators to fit mathematical models to data, and also to produce graphs designed for statistical analysis. Students are expected to read critically and interpret problem situations described in writing, and to write reports. This course prepares students to take the Advanced Placement Statistics examination.

Preparation for the AP Statistics Exam will be incorporated into the course. For those students who achieve a 4 or 5 on the exam, college credit can be awarded.

ADVANCED PLACEMENT COMPUTER SCIENCE A – JAVA (UCMST) (GR/MMC) (SMR) - NR85   12   1.0 credit
PREREQUISITE: Successful completion of Mathematical Analysis

Advanced Placement Computer Science – JAVA is designed to provide advanced training in computer science using the Java language. Topics of study include fundamental and advanced algorithms, data structures and data manipulation, discrete mathematics, linked lists, stacks and recursion.

ADVANCED PLACEMENT CALCULUS BC (OLE) (GR/MMC) (SMR) – E162   12   1.0 credit
PREREQUISITE: Successful completion of 4 years of secondary mathematics including Accelerated Trigonometry/Analytic Geometry or Precalculus or Accelerated Precalculus and teacher recommendation

The topic outline for Advanced Placement Calculus BC includes all Advanced Placement CALCULUS AB topics. Additional topics include: parametric, polar, and vector functions, derivatives of parametric, polar, and vector functions, applications of integrals, antiderivatives, and polynomial approximations and infinite sequences and series. Students have the opportunity to take the Advanced Placement Calculus BC Examination for possible college credit. Graphing calculators are required for the AP tests.

SCIENCE

ACCELERATED CHEMISTRY – AC (UCMST) (GR/MMC) – D800   9   1.0 credit
Accelerated Chemistry is an integrated laboratory-based course investigating the chemical concepts of atomic and molecular structure, and properties of matter and stoichiometry as they relate to inorganic and organic chemistry. There a full research component in which students will investigate and present a topic of interest using methods consistent with science professionals.

BIOCHEMISTRY AND FOUNDATION OF RESEARCH (UCMST) (GR/MMC) – D810   10   1.0 credit
Biochemistry and Foundation of Research is the application of advanced chemical concepts as they relate to biological themes. The curriculum integrates organic chemistry, microbiology, and biochemistry topics with human physiology and genetics. There is a full research component in which students will develop their own experiment and include research to back up claims. Experimental data is evaluated and presented using methods consistent with science professionals.

ACCELERATED ADVANCED BIOLOGY – AC (UCMST) (GR/MMC) – D820   10   1.0 credit
PREREQUISITE: Successful completion of MST Accelerated Chemistry

MST Advanced Biology is designed to provide students opportunities for scientific inquiry as they develop foundational biological concepts. The course emphasizes the chemistry of biology at an organismal and cellular level while allowing students to coordinate laboratory skills with knowledge that can be utilized to pursue chosen research projects. Major topics of study include bio-energenics and cellular reproduction to illustrate how living things obtain and utilize free energy for growth, maintaining homeostasis, and for reproduction. Genetics, protein synthesis and DNA replication emphasize the means by which living systems store information, retrieve information and transmit information. Bio-geochemical cycles and cellular communication explore means by which biological systems interact. Evolution and natural selection are examined as the primary forces creating life's diversity and its unity. The Advanced Biology curriculum is integrated with Foundations of Research. These two classes are foundational as preparation for AP Biology and AP Chemistry.

ADVANCED PLACEMENT PHYSICS B (UCMST) (GR/MMC) – D830   11   1.0 credit
Knowledge of algebra and basic trigonometry is required for the course; the basic ideas of calculus may be introduced in connection with physical concepts, such as acceleration and work. Understanding of the basic principles involved and the ability to apply these principles in the solution of problems is one of the major goals of the course. Consequently, the course will utilize guided inquiry and student-centered learning to foster the development of critical thinking skills. This course includes topics in both classical and modern physics. Newtonian mechanics, fluid mechanics, thermal physics, electricity, magnetism, waves and optics, are the major topics covered. This course will also include a hands-on laboratory component comparable to introductory college-level physics laboratories, student-conducted laboratory investigations representing a variety of topics covered in the course. Each student will complete a lab notebook or portfolio of lab reports.

ADVANCED PLACEMENT BIOLOGY (UCMST) (OLE) (GR/MMC) – D840   12   1.0 credit
Advanced Placement Science topics are offered in biology, chemistry and physics. These courses are offered as preparation for the Advanced Placement Examinations, but provide an excellent, exciting opportunity for mastery and in-depth coverage of interesting science topics even if students do not choose to take the AP exam. Seniors elect two of the three subject areas. Integrated within each of these topic areas are opportunities for independent senior research projects.

ADVANCED PLACEMENT CHEMISTRY (UCMST) (OLE) (GR/MMC) (SMR) - D850   12   1.0 credit

Advanced Placement Science topics are offered in biology, chemistry and physics. These courses are offered as preparation for the Advanced Placement Examinations, but provide an excellent, exciting opportunity for mastery and in-depth coverage of interesting science topics even if students do not choose to take the AP exam. Seniors elect two of the three subject areas. Integrated within each of these topic areas are opportunities for independent senior research projects.

ADVANCED PLACEMENT PHYSICS C MECHANICS (UCMST) (OLE) (GR/MMC) (SMR) – D860   12   1.0 credit

This course will utilize guided inquiry and student centered learning to foster the development of critical thinking and problem solving skills. Introductory differential and integral calculus will be used throughout the course. Newton's laws of motion; work, energy and power; systems of particles and linear momentum; circular motion and rotation; and oscillations and gravitation will be the major topics of study. This course will also include a hands-on laboratory component comparable to introductory university-level physics laboratories, student-conducted laboratory investigations representing a variety of topics covered in the course. Each student will complete a lab notebook or portfolio of lab reports.