

## PHILOSOPHY OF THE MATHEMATICS DEPARTMENT

The Lemont High School Mathematics Department believes students should develop the following characteristics:

- Understanding of concepts and procedures
- Building of mathematical skills through high-quality instruction
- Mastery of material aligned with the Illinois Learning Standards

Courses offered within the mathematics curriculum help students learn challenging mathematics ideas through the implementation of the Common Core State Standards Mathematical Practices. The department is committed to properly integrating technology into all facets of the curriculum in order to enhance the instructional process.

Based on their abilities and course level, students shall study the following content standards to be college and career ready.

- Numbers and Quantity Standard
- Algebra Standard
- Geometry Standard
- Function Standard
- Statistics and Probability Standard
- Modeling Standard

**Grading Standards:** Student grades are determined based on their demonstration of mastery of the required mathematical concepts. **Note:** A graphing calculator is required for all courses in the mathematics curriculum; students should consult with their instructors for more details.

### Common Core Mathematical Practices

Teachers and students use the following practices during the learning process:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

**In order to select the proper Mathematics courses, students should consult the math “flow chart,” which may be viewed on the Lemont High School website.**

### Pre-Essentials for Integrated Math

**Grades Course Open To:** 9-10-11-12    **Credit:** 1.0

**Prerequisite:** None

**Description:** This course is designed to prepare students to master skills and concepts from previous years and to present new concepts that will prepare students for the Integrated Math curriculum. Mathematical Practices will be used in instruction and learning. The majority of the curriculum is based on students’ deficits identified at the beginning of the school year. Additionally, students focus on the ability to translate from the reading of material to the mathematical meanings. **Note:** This course is not accepted by the NCAA Eligibility Center.

# Mathematics

## Essentials for Integrated Math

**Grades Course Open To:** 9-10-11-12    **Credit:** 1.0

**Prerequisite:** Placement based on student's placement exam results

**Description:** This course is designed for students needing additional Mathematical Practices instruction within a rigorous curriculum. Instruction focuses on skills and concepts necessary for students to succeed in Integrated Math I. Students study real numbers; expressions and equations; congruency and similarity of figures; functions and linear relationships; the Pythagorean Theorem; perimeter, area and volume of shapes; and bivariate data. **Note:** This course is not accepted by the NCAA Eligibility Center.

## Integrated Math I GB

**Grades Course Open To:** 9-10-11-12    **Credit:** 2.0

**Prerequisite:** Placement based on student's placement exam results

**Description:** This is the first course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around linear relationships, exponential relationships, concepts of functions and the interpretation of functions, representing and interpreting statistical data, algebraic connections to coordinate geometry, and geometric proofs through transformations with a focus on triangles and quadrilaterals. The course meets daily, which allows additional time for students to develop a proficiency in skills and comprehension of the mathematics language. **Note:** This course is accepted for one credit by the NCAA Eligibility Center.

## Integrated Math I

**Grades Course Open To:** 9-10-11-12    **Credit:** 1.0

**Prerequisite:** Placement based on student's placement exam results

**Description:** This is the first course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around linear relationships, exponential relationships, concepts of functions and the interpretation of functions, representing and interpreting statistical data, algebraic connections to coordinate geometry, and geometric proofs through transformations with a focus on triangles and quadrilaterals.

## Integrated Math I Honors

**Grades Course Open To:** 9    **Credit:** 1.0 - Honors credit

**Prerequisite:** Placement based on student's placement exam results

**Description:** This is the first course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around linear relationships, exponential relationships, concepts of functions and the interpretation of functions, representing and interpreting statistical data, algebraic connections to coordinate geometry, and geometric proofs through transformations with a focus on triangles and quadrilaterals. Additionally, the depth of concepts provides opportunities for students to explore a variety of STEM topics related to the different units. Students in the Integrated Math Honors curriculum also are expected to learn a variety of mathematical topics and integrate those topics while exploring practice sets. Mathematical modeling is significant in this course.

# Mathematics

## Integrated Math II

**Grades Course Open To:** 10-11-12      **Credit:** 1.0

**Prerequisite:** Successful completion of any level of Integrated Math I

**Description:** This is the second course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around extending the number system, quadratic functions, comparison and transformations of functions, similarities of geometric shapes, right triangles and trigonometry, conditional probability, and circles.

## Integrated Math II Honors

**Grades Course Open To:** 9-10      **Credit:** 1.0 - Honors credit

**Prerequisite:** Grade of C or better in Integrated Math I Honors or grade of A in Integrated Math I

**Description:** This is the second course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around extending the number system, quadratic functions, comparison and transformations of functions, similarities of geometric shapes, right triangles and trigonometry, conditional probability, and circles. Additionally, the depth of concepts provides opportunities for students to explore a variety of STEM topics related to the different units. Students in the Integrated Math Honors curriculum also are expected to learn a variety of mathematical topics and integrate those topics while exploring practice sets. Mathematical modeling is significant in this course.

## Integrated Math III Representations

**Grades Course Open To:** 11-12      **Credit:** 1.0

**Prerequisite:** Successful completion of Integrated Math II

**Description:** This is the third course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and be able to apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around statistics, geometric proofs, polynomial and rational representations, logarithmic and exponential representations, and trigonometric representations. This course focuses on the primary standards associated with the concepts.

## Integrated Math III

**Grades Course Open To:** 11-12      **Credit:** 1.0

**Prerequisite:** Grade of C or better in Integrated Math II

**Description:** This is the third course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around statistics, geometric proofs, polynomial and rational representations, logarithmic and exponential representations, and trigonometric representations and modeling.

# Mathematics

## Integrated Math III Honors

**Grades Course Open To:** 10-11      **Credit:** 1.0 - Honors credit

**Prerequisite:** Grade of C or better in Integrated Math II Honors

**Description:** This is the third course of the Integrated Math curriculum. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. In all integrated courses, students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Themes of this particular course are centered around statistics, geometric proofs, polynomial and rational representations, logarithmic and exponential representations, and trigonometric representations and modeling. Additionally, the depth of concepts provides opportunities for students to explore a variety of STEM topics related to the different units. Students in the Integrated Math Honors curriculum also are expected to learn a variety of mathematical topics and integrate those topics while exploring problem sets. Mathematical modeling is significant in this course.

## STEM Math

**Grades Course Open To:** 11-12      **Credit:** 0.5

**Prerequisite:** Grade of C or better in Integrated Math II or successful completion of Integrated Math III

**Description:** This course prepares students for Calculus. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. Themes of this particular course are centered around concepts associated with rational expression manipulation, matrices, complex function manipulation, and complex trigonometric functions and formulas.

## STEM Math Honors

**Grades Course Open To:** 10-11      **Credit:** 0.5 - Honors credit

**Prerequisite:** Grade of C or better in Integrated Math II Honors and concurrent enrollment in Integrated Math III Honors

**Description:** This course prepares students for AP Calculus BC. The course is rigorous, as students are expected to learn the concepts, be fluent at processing the skills, and apply concepts to mathematical situations at the appropriate level. Students are expected to use the Mathematical Practices within the course. Themes of this particular course are centered around concepts associated with rational expression manipulation, matrices, complex function manipulation, and complex trigonometric functions and formulas. Additionally, the depth of concepts provides opportunities for students to explore a variety of STEM topics related to the different units. Students in the Integrated Math Honors curriculum also are expected to learn a variety of mathematical topics and integrate those topics while exploring problem sets. Mathematical modeling is significant in this course.

# Mathematics

## Quantitative Literacy

**Grades Course Open To:** 12                      **Credit:** 1.0

**Prerequisite:** Successful completion of any level of Integrated Math III

**Description:** This course is designed for college-bound students who do not intend to study Calculus but are seeking placement into a credit-bearing general education mathematics course in college. Students enrolled in this course, which serves as a transitional mathematics course and is articulated with College of DuPage, must already have met the school's graduation requirement in mathematics. The course's content is designed to develop mathematical reasoning with modeling and real world examples. Students are expected to use the Mathematical Practices within the course. Students address the areas of Numbers and Quantities, Functions, Statistics, Geometry and Algebra. Students completing this course with a C or better will be eligible to use the course grade as a placement into a math course at any Illinois community college. Other colleges and universities also may accept the results of this course as a student's placement for college mathematics.

## Modern Mathematics

**Grades Course Open To:** 12                      **Credit:** 1.0

**Prerequisite:** Successful completion of Integrated Math III or Integrated Math III Honors, or a grade of B or better in Integrated Math III Representations; and a score of 22 or better on the Mathematics section of the ACT or 530 or better on the Mathematics section of the SAT

**Fees:** Course fee applies, payable to Joliet Junior College (fee was \$50 for the 2019-20 school year)

**Dual/Articulated Credit:** 3.0 hours of dual credit (MATH 127) through Joliet Junior College

**Description:** This course is designed for college-bound students who do not intend to study Calculus. Mathematical topics are integrated into the physical and social sciences through a focus on mathematical reasoning and mathematical modeling. An emphasis is placed on the application of mathematics to real-life problems. Topics include finance, social choice theory, cryptography, graph theory, mathematics of nature and probability. Transferable college credit is given upon successful completion of the course.

## Statistics

**Grades Course Open To:** 11-12                      **Credit:** 0.5

**Prerequisite:** Successful completion of Integrated Math III

**Description:** This course teaches students how to use the four steps of the statistical process – ask questions, collect data, analyze data, and make conclusions – doing so within the context of sports. Major statistical topics include: making appropriate graphical displays for univariate and bivariate data; calculating and interpreting summary statistics for univariate and bivariate data; least squares regression; the concept of independence; probability distributions, including the binomial and normal distributions; and proper methods of data collection, including sampling and experiments. Use of technology, including statistical software, online applets and graphing calculators, is prominent in the course.

# Mathematics

## Calculus

**Grades Course Open To:** 11-12      **Credit:** 1.0

**Prerequisite:** Grade of C or better in Integrated Math III and grade of C or better in STEM Math, and cumulative GPA of 3.0 or better; students may be required to complete a college placement exam

**Fees:** Dual credit course fee applies, payable to Loyola University Chicago (fee was \$260 for the 2020-21 school year)

**Dual/Articulated Credit:** 4.0 hours of dual credit (MATH 161) through Loyola University Chicago

**Description:** This course is the first in a college-level Calculus sequence. Students must demonstrate mastery of concepts and skills learned in previous courses. The course content is comprised of linear, polynomial, logarithmic and exponential functions. Students develop all basic concepts of differential and integral calculus of functions in one variable. A thorough discussion of the concept of limits and its application to advanced mathematics is included. Other major topics covered are the nature and applications of the integral, techniques of integration, and elementary differential equations. Several applications are studied, such as area and optimization of functions. The calculus of transcendental functions is also part of this course. Transferable college credit is given upon successful completion of the course.

## AP Calculus BC

**Grades Course Open To:** 11-12      **Credit:** 1.5 - weighted for AP

**Prerequisite:** Grade of B or better in Integrated Math III Honors and STEM Math Honors, and a score of 76 or better on the ALEKS exam

**Fees:** AP Calculus BC exam (paid at fall registration) and course fee applies, payable to Joliet Junior College (fee was \$50 for the 2019-20 school year)

**Dual/Articulated Credit:** 5.0 hours of dual credit (MATH 170) through Joliet Junior College

**Description:** This is one of the top-level courses offered by the mathematics department, and can be the equivalent of two semesters of calculus courses offered at the college level. Students must demonstrate mastery of concepts and skills learned in previous courses. The course content is comprised of linear, polynomial, logarithmic, exponential, polar and vector functions, and introduces and develops all basic concepts of limits and their application to advanced mathematics. Fundamental integration, as well as advanced integration techniques, are examined. Other topics include: solving differential equations, infinite series, and power series for elementary functions. Only those students who intend to take college-level mathematics courses and who have shown a high degree of aptitude in previous mathematics courses should enroll. The course meets daily in the first semester, and every other day in the second semester. Transferable college credit is given upon successful completion of the course. **Note:** All students enrolled in this course **must** take the AP Calculus BC exam in the spring.

## AP Statistics

**Grades Course Open To:** 11-12      **Credit:** 1.0 - weighted for AP

**Prerequisite:** Grade of C or better in Integrated Math III or Integrated Math III Honors

**Fees:** AP Statistics exam (paid at fall registration)

**Description:** This advanced-level course introduces students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. Students are exposed to four broad conceptual themes: exploring data, planning a study, anticipating patterns, and statistical inferences. Among the many topics discussed are: interpreting graphical displays of distribution, summarizing and comparing distributions, exploring bivariate and categorical data, methods of data collection, planning and conducting surveys and experiments, generalizability of results from observations and experiments, probability as relative frequency, combining independent random variables, confidence intervals, tests of significance, and special cases of normally distributed data. Students who are successful in this course may receive advanced placement, college credit or both for a one-semester introductory college statistics course. **Note:** All students enrolled in this course **must** take the AP Statistics exam in the spring.

# Mathematics

## Advanced Calculus

**Grades Course Open To:** 12                      **Credit:** 1.0 - Honors Credit

**Prerequisite:** Score of 4 or 5 on the AP Calculus BC Exam to be eligible for dual credit

**Fees:** Dual credit course fee applies, payable to Loyola University Chicago (fee was \$260 for the 2020-21 school year)

**Dual/Articulated Credit:** 4.0 hours of dual credit (MATH 263) through Loyola University Chicago

**Description:** The most advanced mathematics course offered by the department, this is the third course in calculus and analytic geometry, and is the equivalent of a one-semester course offered at the college level. Major units of study include functions of several variables, partial derivatives, parametric plotting, vectors, perpendicularity, 2D integration, gradients, trajectories, 2D and 3D measurements, sources and sinks, transforming 2D and 3D integrals, spherical coordinates and 3D flow. Only those students who intend to take college-level mathematics courses and have shown a high degree of aptitude in previous mathematics courses should enroll. This course may be taught off-campus at another local institution, and college credit typically is awarded upon successful completion of the course.