# St. Joseph Central Catholic High School Mathematics

Here at St. Joseph Central Catholic High School, we believe that "Mathematics is the language with which God has written the universe" (Galileo). With that in mind, we have developed the following course guidebook and sequencing pathways for our students. Our school requires that students take a math course **every** year in which they are enrolled, and with that in mind, there are plenty of options. Since at least one mathematics course is required for all college majors, we have various choices for students going into both math fields and non-math fields upon graduation, including two Advanced Placement (AP) courses and 15 hours of Dual Credit mathematics through Marshall University.   Dual credit hours earned while at St. Joseph will transfer to any university that accepts credits from Marshall.

### *Required Courses:*
Students are required to take the following courses to graduate:

1. Algebra I
2. Geometry
3. Algebra II (Advanced or Regular)
4. One elective listed below

### *Electives:*
- ❖ Financial Algebra
- ❖ Concepts & Applications  (MTH 121B - 4 hours dual credit)
- ❖ College Algebra (MTH 127 - 5 hours dual credit) → 1st Semester
  Introduction to Statistics (STA 225 - 3 hours dual credit) → 2nd Semester
- ❖ Advanced Trigonometry/Pre-Calculus (MTH 122 - 3 hours dual credit)
- ❖ AP Calculus AB
- ❖ AP Calculus BC

## Course Sequencing Options

|  | Pathway 1 | Pathway 2 | Pathway 3 | Pathway 4 | Pathway 5 | Pathway 6 | Pathway 7 |
|---|---|---|---|---|---|---|---|
| 8th |  |  | Algebra I | Algebra I | Algebra I | Geometry | Algebra II |
| 9th | Algebra I | Algebra I | Geometry | Geometry | Geometry and Adv. Algebra II | Adv. Algebra II | Adv. PreCalc/Trig |
| 10th | Geometry | Geometry and Adv. Algebra II | Algebra II | Adv. Algebra II | Adv. PreCalc/Trig | Adv. PreCalc/Trig | AP Calculus AB |
| 11th | Algebra II or Adv. Algebra II | Adv. PreCalc/Trig | Financial Algebra | Adv. PreCalc/Trig | AP Calculus AB | AP Calculus AB | AP Calculus BC |
| 12th | 4th course option | 4th course option | Concepts & Applications | 4th course option | 4th course option | 4th course option | 4th course option |

- 4th course options include: Financial Algebra, Concepts & Applications, Advanced Pre-Calc/Trig, College Algebra/Intro to Stats, AP Calculus AB, and AP Calculus BC (these courses have different prerequisites).

- Students may double up and take Geometry and Algebra II Advanced in the same year, upon completion of an entrance exam and with a teacher recommendation (see Pg. 5). The ONLY reason a student should "double" in Geometry/Advanced Algebra II is because they wish to take Calculus AB/BC. A student can receive credit in all other courses without taking two math classes in one year.

- Students may double up on Pre-Calculus/Trig and Financial Algebra in their junior year.

- Students may double up on any combination of Financial Algebra, College Algebra/Statistics, Concepts, Calculus AB, and Calculus BC (with the exception of pairing AB and BC in the same year) in their senior year.

- College Algebra/Statistics and Concepts & Applications are reserved for Seniors.

- **Any student wishing to deviate from these tracks must receive written approval from the math department and school administration.**

## **Course Descriptions**

**Algebra I**:  Students in this course will focus on five critical units that deepen understanding of the relationships between quantities and reasoning with equations, linear and exponential relationships, descriptive statistics, expressions and equations, and quadratic functions and modeling.

**Geometry**:  Students in this course will explore complex geometric situations and relationships, focusing on: congruence, proof, and constructions; similarity, proof, and trigonometry; extending to three dimensions; connecting algebra and geometry through coordinates; circles; applications of probability; and modeling with geometry.  *Prerequisite:  Algebra I*

**Algebra II**:  Students in this course will build on their work with linear, quadratic, and exponential functions and extend their repertoire of functions to include polynomial, rational, and radical functions, as well as modeling with functions.  *Prerequisite:  Geometry*

**Algebra II Advanced (Honors)**:  Students in this course will build on their work with linear, quadratic, and exponential functions and extend their repertoire of functions to include polynomial, rational, and radical functions, as well as modeling with functions, going above and beyond the scope of regular Algebra 2.  *Prerequisite:  Geometry with a grade of B or better. Corequisite: Must be accepted via teacher recommendation and entrance exam.*

**Pre-Calculus / Trigonometry (Honors)**:  Students in this course will take an extensive look at the relationships among complex numbers, vectors, and matrices, as well as solving exponential equations using the properties of logarithms.  Students will also study the relationships involving lengths of sides and angles of triangles and expand their work with trigonometric functions and their inverses, including the use of trigonometric identities.  *Prerequisite:  Algebra II Advanced with a grade of B or better.*
<span style="color:red">**Dual Credit:**</span>  Students may earn three hours credit in this course from Marshall University for MTH 122 Trigonometry.  *Prerequisite:  3.0 GPA and an ACT Math score of at least 22 or SAT Math score of at least 520.  The following items are necessary for students prior to the Junior year in high school: Students must maintain a 2.00 GPA in all college courses. Standardized test scores must meet the following criteria: An ACT/SAT at the 85th percentile or above (ACT = 24 composite, SAT  = 1160 CR+M).*

**Financial Algebra**:  Students in this course will focus on financial applications designed to deepen and extend understanding of mathematics, through developing a strong foundation in logical thinking and problem solving that will enable students to make informed decisions regarding matters of money and finance in their daily lives.  *Prerequisite:  Algebra II.*

**Concepts and Applications**:  Students in this course will develop quantitative reasoning, logical thinking, and problem solving skills through topics such as linear modeling, beginning statistical methods and probability, exponential and logarithmic models, formula use, spatial and geometric modeling, and financial concepts.  *Prerequisite:  Algebra II*
**Dual Credit:**  Students may earn 4 hours credit from Marshall University for MTH 121B Concepts and Applications.  *Prerequisite:  3.0 GPA and have taken the ACT or SAT.*

**College Algebra / Intro to Statistics (Honors)**:  During the first semester of this course, students will have a brief but careful review of the main techniques of Algebra, including polynomial, rational, exponential, and logarithmic functions, as well as graphs, equations and inequalities, and sequences.  During the second semester of this course, students will cover basic probability, descriptive statistics, fundamental statistical inference procedures, parameter estimation, and hypothesis testing for a variety of situations with wide applications.  *Prerequisite:  Algebra II*
**Dual Credit:**  Students may earn 5 hours credit first semester from Marshall University for MTH 127 College Algebra.  Students may earn 3 hours credit second semester from Marshall University for STA 225 Introductory Statistics.  *Prerequisite for MTH 127:  3.0 GPA and an ACT Math score of at least 17 or SAT Math Score of 460.*

**AP Calculus AB (Advanced Placement)**:  Calculus is a transition course to upper-division mathematics and computer science courses. Students will extend their experience with functions as they study the fundamental concepts of calculus: limiting behaviors, difference quotients and the derivative, Riemann sums and the definite integral, antiderivatives and indefinite integrals, and the Fundamental Theorem of Calculus. Students review and extend their knowledge of trigonometry and basic analytic geometry. Important objectives of the calculus sequence are to develop and strengthen the students' problem-solving skills and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply the tools of calculus to a variety of problem situations.  Students are required to take the AP Calculus AB exam at the end of this course.  *Prerequisite:  Advanced PreCalculus/Trigonometry with a grade of B or better.*

**AP Calculus BC (Advanced Placement)**:  AP Calculus BC is a course designed to develop a student's conceptual understanding of calculus. Students will use their reasoning to solve specific applications through the use of appropriate technology including the use of graphing calculators. Applications will be presented analytically, numerically, graphically, and verbally and students are expected to communicate their solutions and justifications verbally and in written form. Special attention is given to helping students use correct justification of answers using specific theorems and correct units as part of their analysis.  Students are required to take the AP Calculus BC exam at the end of this course.  *Prerequisite:  AP Calculus AB with a grade of B or better.*

## **Geometry/Advanced Algebra II Doubling**

Specific prerequisites are required for any student who wishes to take both Geometry and Advanced Algebra II math classes in a single school year. The student must have earned an A in Algebra I, pass a written entrance exam, and have a written recommendation from your Algebra I teacher. The recommendation form can be found on our school website.

In the spring of each year, a study guide for the entrance exam will be posted to [www.stjosephhs.org](www.stjosephhs.org) or can be obtained from the school office. The entrance exam will be administered *at least twice* before the start of school: once in May and once in August. Exact dates will be announced each spring.

Please think carefully before deciding if this is the path for your student. The transition into our high school academic arena is difficult, and adding two math courses can be a challenge to some students. ***However, once you have decided your math path, it will dictate what options are available in the subsequent years***.

Please check our website, [www.stjosephhs.org](www.stjosephhs.org), for updated information.

**<u>Mu Alpha Theta</u>**
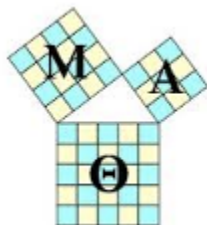
Mu Alpha Theta is a National High School and Two-Year College Mathematics Honor Society. As of June 2014, Mu Alpha Theta had 105,000 student members in more than 2,100 schools nationwide.  In order to be involved in St. Joseph's chapter of Mu Alpha Theta, *students must maintain an overall GPA of a 3.0, a mathematics GPA of a 3.5, and have completed Algebra II*. The goal of Mu Alpha Theta is to instill a keen interest in mathematics in students and to promote the enjoyment of mathematics.  St. Joseph's chapter of Mu Alpha Theta strives to uphold these standards in our school and community.

Mu Alpha Theta club meetings are typically held once a month during lunch.  Members of Mu Alpha Theta sponsor math tutoring for all St. Joseph High School students once a week after school.  Club members also participate in several service projects throughout the year.

Applications for admission are taken at the beginning of each school year.

*"Good mathematics is not about how many answers you know ··· It's about how you behave when you don't know."*      *-Author Unknown*