GUILFORD County Schools

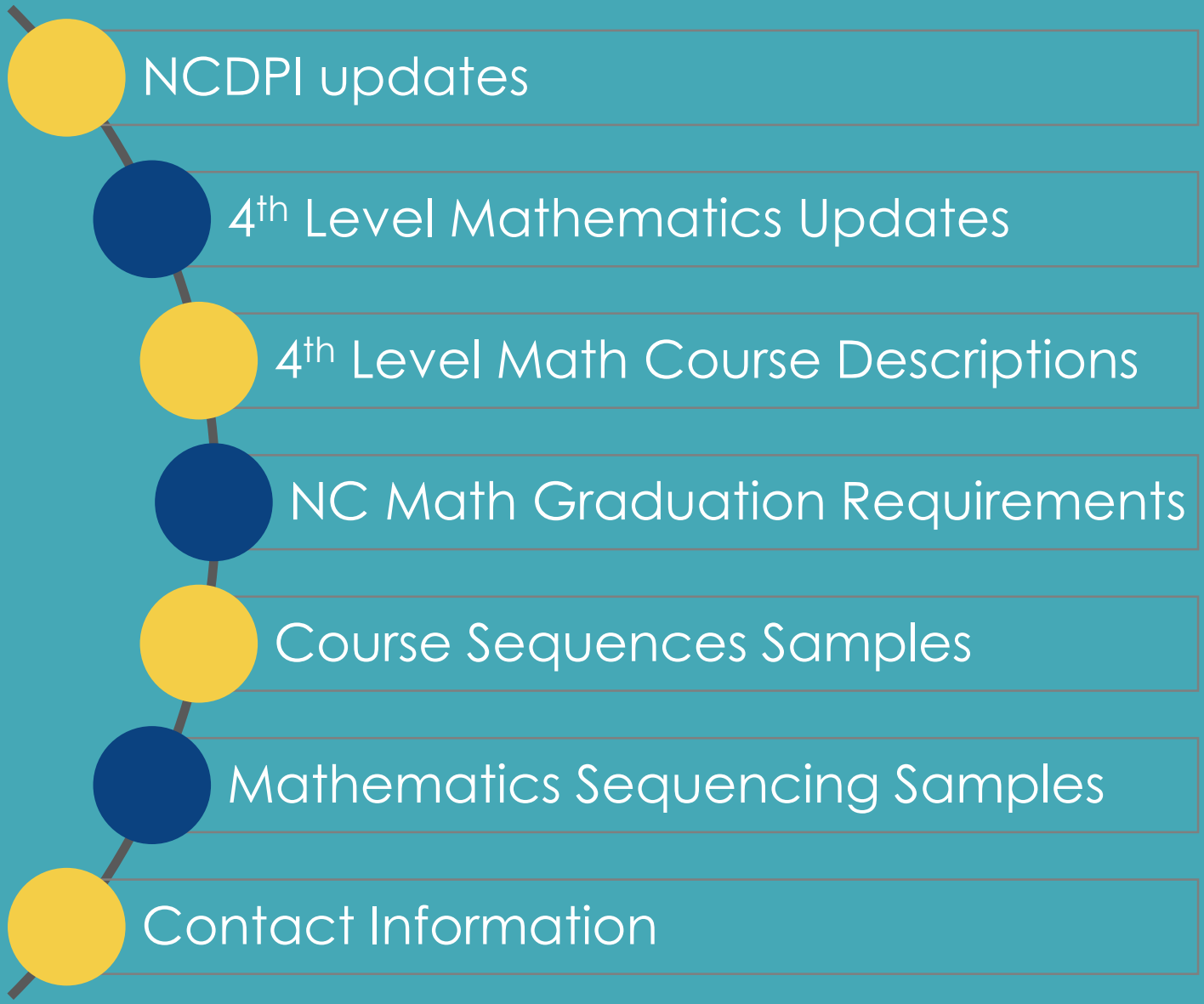
SOAR TO GREATNESS

4th Level Mathematics

Northern High School

February 24, 2020

Agenda


NCDPI updates
4th Level Mathematics Updates
4th Level Math Course Descriptions
NC Math Graduation Requirements
Course Sequences Samples
Mathematics Sequencing Samples
Contact Information

NCDPI Updates

The following courses are no longer available for all student starting in 2020-21.

- Students who have earned credit in the following courses prior to the 2020-21 school year, can still use those credits to meet NC graduation requirements for mathematics.

- Advanced Functions and Modeling (AFM)*

Students who earned credit for AFM can still use the course to meet the Minimum Course Requirements for admission at UNC System Institutions.

4th Level Math Updates

- The current content standards for AFM, PreCalculus, and Discrete Math were adopted by the NC State Board of Education in 2003.
- March 2019 – ongoing – 4th level standards written and revised: Domains, Strands, Standards, clarifications, and indicators with solutions for each course, based on educators' and public feedback. Final draft will be released in March 2020.
- August 8, 2019 – SBE unanimously approved the proposed mathematics content standards for the 4th Level Mathematics Courses.
- Implementation with aligned assessments 2020-21.

Focus of 4th Level Math Standards

What is best for North Carolina's students?

4th-level Math Course Descriptions

Discrete Mathematics for Computer Science

The purpose of this course is to introduce discrete structures that are the backbone of computer science. Discrete mathematics is the study of mathematical structures that are countable or otherwise distinct and separable. The mathematics of modern computer science is built almost entirely on discrete mathematics, such as logic, combinatorics, proof, and graph theory. At most universities, an undergraduate-level course in discrete mathematics is required along with calculus for students who plan to pursue careers as computer programmers, software engineers, data scientists, security analysts and financial analysts. Students will be prepared for college level algebra, statistics, and discrete mathematics courses after taking this course.

Discrete Mathematics for Computer Science Domains and Standards:

Number and Quantity:

- Apply operations with matrices and vectors.
- Understand matrices to solve problems.
- Understand set theory to solve problems.
- Understand statements related to number theory and set theory.

Functions:

- Apply recursively-defined relationships to solve problems.

Statistics and Probability:

- Apply combinatorics concepts to solve problems.

Graph Theory:

- Understand graph theory to model relationships and solve problems.
- Apply graph theory to solve problems.

Logic:

- Evaluate mathematical logic to model and solve problems.

NC Math 4

The primary focus of this course is on functions and statistical thinking, continuing the study of algebra, functions, trigonometry and statistical concepts previously experienced in NC Math 1-3. The course is designed to be a capstone to introductory statistical concepts. Additionally, the course intentionally integrates concepts from algebra and functions to demonstrate the close relationship between algebraic reasoning as applied to the characteristics and behaviors of more complex functions. In many cases, students majoring in non-STEM fields will take an entry-level college algebra or introductory statistics course, which students would be well prepared to take after this course. Students who decide to major in a STEM field will be well positioned to take a college precalculus course after taking this course.

NC Math 4 Domains and Standards:

Number and Quantity:

- Apply properties and operations with complex numbers.
- Apply properties and operations with matrices and vectors.

Statistics and Probability:

- Create statistical investigations to make sense of real-world phenomena.
- Apply informal and formal statistical inference to make sense of, and make decisions in, meaningful real-world contexts.
- Apply probability distributions in making decisions in uncertainty.

Algebra and Functions:

- Apply properties of function composition to build new functions from existing functions.
- Apply properties of trigonometry to solve problems.
- Apply the properties and key features of logarithmic functions.
- Understand the properties and key features of piecewise functions.
- Understand how to model functions with regression

Precalculus

The purpose of this course is to build upon the study of algebra, functions, and trigonometry experienced in NC Math 1, 2, and 3. This course will grow students' algebraic skills and understanding of functions to deepen understanding of the functions in the course and delve into real world phenomena. This course is designed for students pursuing careers in quantitatively heavy fields, including STEM. Students will be prepared for Calculus, AP Calculus and any entry-level college course after taking this course.

Precalculus Domains and Standards

Number and Quantity:

- Apply properties of complex numbers and the complex number system.
- Apply properties and operations with matrices.
- Understand properties and operations with vectors.

Algebra:

- Apply properties of solving inequalities that include rational and polynomial expressions in one variable.
- Apply properties of solving equations involving exponential, logarithmic, and trigonometric functions.

Functions:

- Understand key features of sine, cosine, tangent, cotangent, secant and cosecant functions.
- Apply properties of a unit circle with center (0,0) to determine the values of sine, cosine, tangent, cotangent, secant, and cosecant.
- Understand the relationship of algebraic and graphical representations of exponential, logarithmic, rational, power functions, and conic sections to their key features.
- Apply properties of function composition to build new functions from existing functions.
- Apply mathematical reasoning to build recursive functions and solve problems.
- Apply mathematical reasoning to build parametric functions and solve problems.

North Carolina Mathematics Graduation Requirements

North Carolina Mathematics Graduation Requirements
Options Charts for the 2020-21 School Year

1. Admission into a UNC System Institution

The following courses will fulfill the NC graduation requirements for mathematics and meet the UNC System Institution Minimum Course Requirements for admission. For admission into universities and colleges outside of the UNC System Institution, please check with that institution's admissions office for requirements and recommendations.

Students must earn credit for:

- **2109 – NC Math 1**
- **2209 – NC Math 2**
- **2309 – NC Math 3**

And 1 credit from the following:

NC SCOS – 4th Level Math Courses

- 2401 – Discrete Mathematics for Computer Science* New name and revised standards
- 2403 – Pre-Calculus* Revised standards
- 2409 – NC Math 4* New option

Advance Placement Courses

- 2A00 – AP Calculus AB
- 2A01 – AP Calculus BC
- 2A03 – AP Statistics

Community College Course

- 2C01 – MAT 143 – Quantitative Literacy
- 2C02 – MAT 152 – Statistical Methods I
- 2C03 – CCP – MAT 171 – Precalculus Algebra
- 2C04 – CCP – MAT 172 – Precalculus Trigonometry
- 2C05 – MAT 263 – Brief Calculus
- 2C06 – CCP – MAT 271 – Calculus I
- 2C07 – MAT 272 – Calculus II
- 2C11 – MAT 252 – Statistics II
- 2C12 – MAT 273 – Calculus III
- 2C13 – MAT 280 – Linear Algebra
- 2C14 – MAT 285 – Differential Equations
- 2C15 – MAT 141 – Mathematical Concepts I
- 2C16 – MAT 142 – Mathematical Concepts II

International Baccalaureate Courses

- 2I028 – IB Mathematical Studies SL
- 2I038 – IB Mathematics SL
- 2I048 – IB Mathematics HL
- 2I058 – IB Further Math HL
- 2I068 – IB Analysis and Approaches SL
- 2I078 – IB Analysis and Approaches HL
- 2I088 – IB Applications & Interpretations SL
- 2I098 – IB Applications & Interpretations HL

North Carolina Mathematics Graduation Requirements

North Carolina Mathematics Graduation Requirements
Options Charts for the 2020-21 School Year

2. Admission into a Community College or Technical School *The following courses will fulfill the NC graduation requirements for mathematics. The North Carolina Community College System does not require any specific 4th math course for admission. Students may also earn a credit in a course listed on the Admission into a UNC Institution Chart.*	**Students must earn credit for:** • **2109 – NC Math 1** • **2209 – NC Math 2** • **2309 – NC Math 3** And 1 credit from the following:
Additional Mathematics Courses • 2090 – Foundations of NC Math 1 • 2091 – Foundations of NC Math 2 • 2092 – Foundations of NC Math 3 • 2013 – CCRG Mathematics* New option	**CTE Paired Courses that fulfill 1 of the 4 required mathematics credits for graduation** • IC11 – Masonry I **AND** IC12 – Masonry II • IM21 – Woodworking I **AND** IM22 – Woodworking II^{R} *New Paired Option* • TS31 – Game Art and Design **AND** TS32 – Advanced Game Art and Design • IC 41 – Electrical Trades I **AND** IC42 – Electrical Trades II • IC22 – Carpentry II **AND** IC23 – Carpentry III
Advanced Placement and International Baccalaureate Courses • 2A02 – AP Computer Science • 21008 – IB Computer Science SL • 21018 – IB Computer Science HL	
CTE Single Courses that fulfill 1 of the 4 required mathematics credits for graduation • 0A02 – AP Computer Science Principles • BA10 – Accounting I	• TP21 – PLTW Digital Electronics • TP22 – PLTW Computer Integrated Manufacturing • TP23 – PLTW Civil Engineering and Architecture • TP25 – PLTW Aerospace Engineering • TP27 – PLTW Environmental Sustainability

North Carolina Mathematics Graduation Requirements

North Carolina Mathematics Graduation Requirements
Options Charts for the 2020-21 School Year

3. Enter directly into a Career after High School *The following courses will fulfill the NC graduation requirements for mathematics. Students may also earn a credit in a course listed on the Admission into a UNC Institution Chart.*	**Students must earn credit for:** • **2109 – NC Math 1** • **2209 – NC Math 2** • **2309 – NC Math 3** And 1 credit from the following:
Additional Mathematics Courses • 2090 – Foundations of NC Math 1 • 2091 – Foundations of NC Math 2 • 2092 – Foundations of NC Math 3 • 2013 – CCRG Mathematics* New option	**CTE Paired Courses that fulfill 1 of the 4 required mathematics credits for graduation** • IC11 – Masonry I **AND** IC12 – Masonry II • IM21 – Woodworking I **AND** IM22 – Woodworking II[R] *New Paired Option* • TS31 – Game Art and Design **AND** TS32 – Advanced Game Art and Design • IC 41 – Electrical Trades I **AND** IC42 – Electrical Trades II • IC22 – Carpentry II **AND** IC23 – Carpentry III
Advanced Placement and International Baccalaureate Courses • 2A02 – AP Computer Science • 21008 – IB Computer Science SL • 21018 – IB Computer Science HL	
CTE Single Courses that fulfill 1 of the 4 required mathematics credits for graduation • 0A02 – AP Computer Science Principles • BA10 – Accounting I • BA20 – Accounting II • BM20 – Microsoft Excel[R] *New Option*	• TP21 – PLTW Digital Electronics • TP22 – PLTW Computer Integrated Manufacturing • TP23 – PLTW Civil Engineering and Architecture • TP25 – PLTW Aerospace Engineering • TP27 – PLTW Environmental Sustainability • TP31 – PLTW Engineering Design and Development • FA31 – Apparel & Textile Production I

Course Sequences Samples

Course Sequences						
	During High School		Following High School			
Content Area	CTE Pathway	Associate Degree	4-year Ivy League School	UNC System Institution	Community College or Technical School	Career
English	English I or English I Honors English II or English II Honors English III or English III Honors English IV or English IV Honors	English I or English I Honors English II or English II Honors English III or English III Honors English IV or English IV Honors	English I Honors English II Honors AP English Language and Composition AP Literature and Composition	English I or English I Honors English II or English II Honors English III Honors or AP English Language and Composition English IV Honors or AP English Literature and Composition	English I or English I Honors English II or English II Honors English III or English III Honors English IV or English IV Honors	English I or English I Honors English II or English II Honors English III or English III Honors English IV or English IV Honors
Mathematics	NC Math 1 or NC Math 1 Honors NC Math 2 or NC Math 2 Honors NC Math 3 or NC Math 3 Honors AP Computer Science Principles, approved CTE courses, or 4th math from UNC list	NC Math 1 or NC Math 1 Honors NC Math 2 or NC Math 2 Honors NC Math 3 or NC Math 3 Honors AP Computer Science Principles, approved CTE courses, or 4th math from UNC list	NC Math 1 Honors NC Math 2 Honors NC Math 3 Honors Precalculus AP Calculus AB/BC AP Statistics	NC Math 1 or NC Math 1 Honors NC Math 2 or NC Math 2 Honors NC Math 3 or NC Math 3 Honors 4th Math: Precalculus, Discrete Math for Computer Science, NC Math 4, or NC Math 4 Honors AP Calculus AB/BC AP Statistics	NC Math 1 or NC Math 1 Honors NC Math 2 or NC Math 2 Honors NC Math 3 or NC Math 3 Honors AP Computer Science Principles, approved CTE courses, or 4th math from UNC list	NC Math 1 or NC Math 1 Honors NC Math 2 or NC Math 2 Honors NC Math 3 or NC Math 3 Honors AP Computer Science Principles, approved CTE courses, or 4th math from UNC list

Mathematics Sequencing Samples

Middle School	Grade 9	Grade 10	Grade 11	Grade 12
4-Year Ivy League School Course Sequence Sample				
NC Math 1 NC Math 2	NC Math 3 Honors	AP Statistics	Precalculus	AP Calculus AB/BC
UNC System Institution Course Sequence Sample				
NC Math 1	NC Math 2 Honors	NC Math 3 Honors	4th Math: Precalculus, Discrete Math for Computer Science, or NC Math 4 Honors	AP Calculus AB/BC or AP Statistics
Community College or Technical School Course Sequence Sample				
	NC Math 1 or NC Math 1 Honors	NC Math 2 or NC Math 2 Honors	NC Math 3 or NC Math 3 Honors	AP Computer Science Principles, approved CTE courses, or 4th math from UNC list
Career Course Sequence Sample				
	NC Math 1 or NC Math 1 Honors	NC Math 2 or NC Math 2 Honors	NC Math 3 or NC Math 3 Honors	AP Computer Science Principles, approved CTE courses, or 4th math from UNC list

Contact Information

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