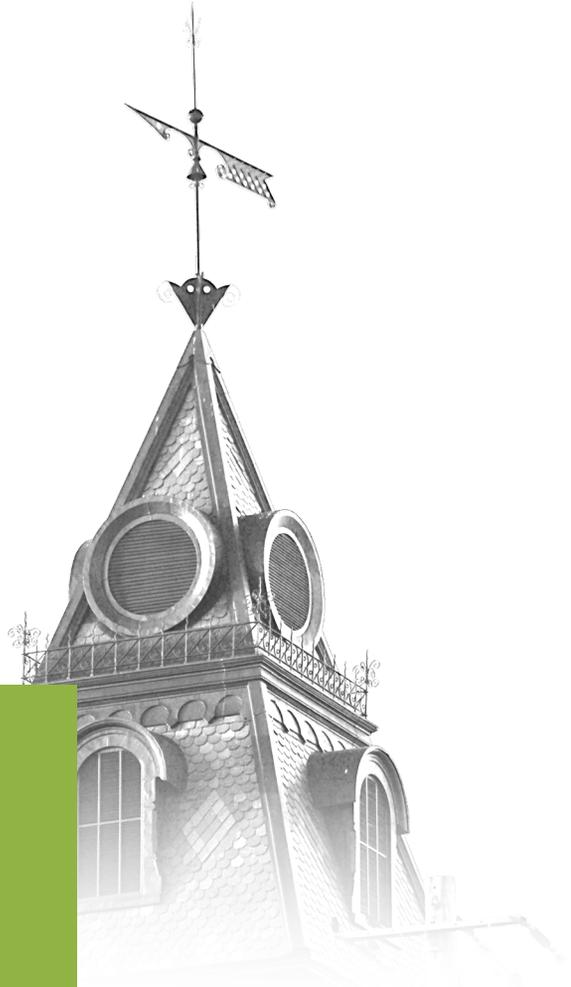


Math Camp
MasterScholar Summer Programs

2025
MasterScholar
North Carolina Math Camp



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2025 MasterScholar
North Carolina Math Camp
—

→ Program Overview

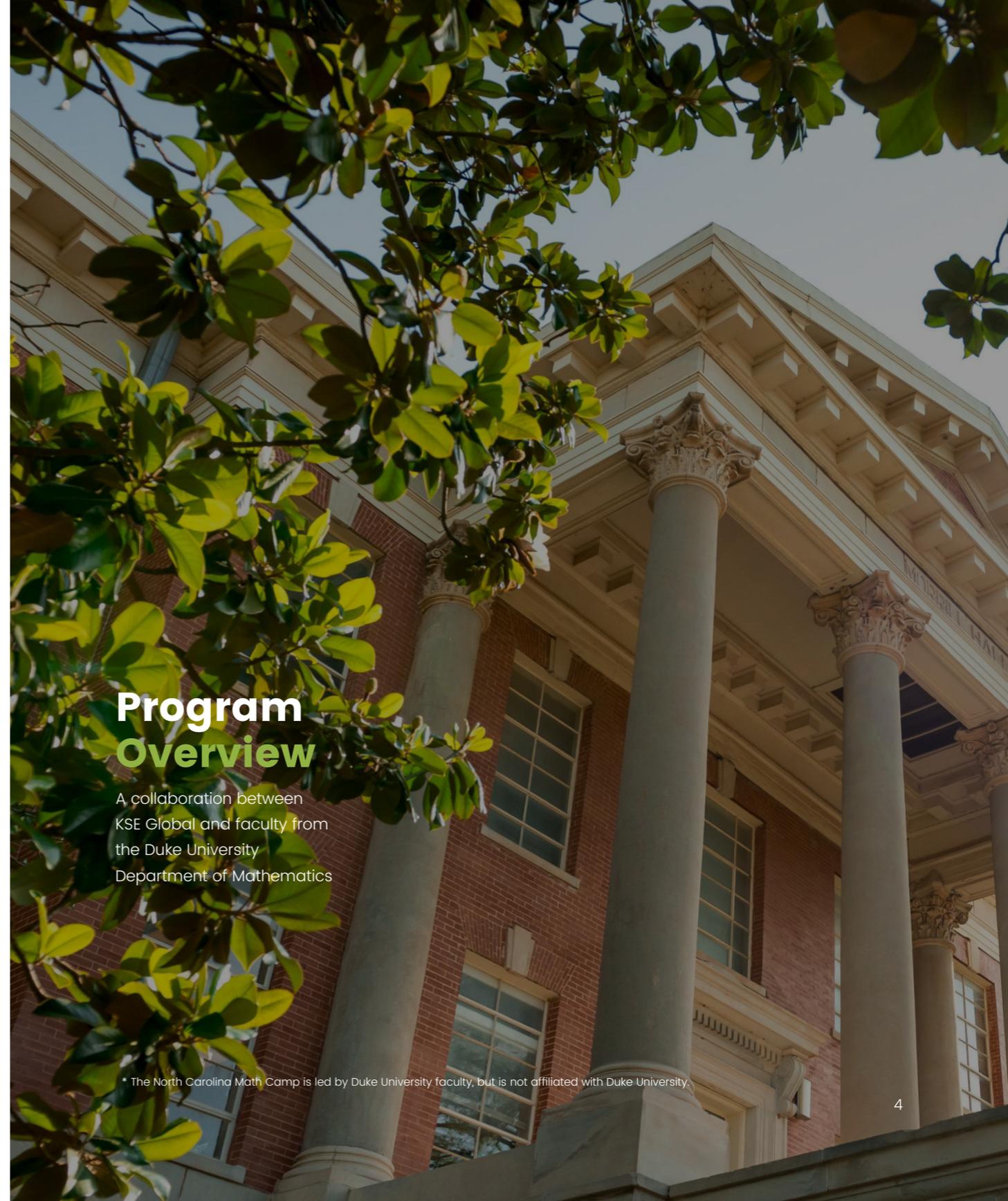
The MasterScholar North Carolina Math Camp (NCMC), a two-week summer academic program co-organized by KSE Global and faculty members from the Duke University Department of Mathematics, presents a valuable opportunity for high school students to delve deeper into the study of advanced mathematics. As a world-class math camp, recommended by MIT as an alternative to the renowned PRIMES program, NCMC not only offers teaching resources from a top-tier university but also focuses on nurturing students' independent research and teamwork skills.

The North Carolina Math Camp emphasizes the development of students' critical thinking abilities through interactive, project-based learning. Professors and teaching assistants from Duke University guide students to approach challenging, complex mathematical problems through a carefully designed curriculum. In addition, every student completes a detailed research paper based on a topic chosen from their courses.

Students who complete the program are awarded a certificate of completion and a project evaluation letter signed by a Duke University professor. These outcomes serve as competitive differentiating credentials for students to include in their college applications.

The MasterScholar North Carolina Math Camp is highly selective. Applicants are expected to have a strong background in high school-level math and a passion for exploring higher-level mathematics.

**a two-week
summer**
academic program



Program Overview

A collaboration between
KSE Global and faculty from
the Duke University
Department of Mathematics

* The North Carolina Math Camp is led by Duke University faculty, but is not affiliated with Duke University.

→ Program Highlights

- Highly selective program, geared towards students seeking advanced studies in mathematics
- Designed and taught by professors from the Duke University Department of Mathematics
- Camp counselors are Duke math majors and graduate students
- Curriculum focused on project-based learning, independent research, and critical thinking
- Opportunity to connect with other high-achieving students from around the world
- Includes fun, engaging extracurricular activities to help students build relationships
- Competitive outcomes for the college admissions process: college-level research paper, program completion certificate, and project evaluation letter



Outcomes

- **College-Level Research Paper**
- **Program Completion Certificate**
- **Project Evaluation Letter**



MASTER SCHOLAR NCMC



2025 MasterScholar
North Carolina Math Camp

→ Program Sessions



The Summer 2025 North Carolina Math Camp is offered in two different sessions: **Session 1, Survey of Mathematics (July 6th - July 19th), and Session 2, Survey of Advanced Mathematics (July 20th - August 2nd).** Within each session, students focus on two distinct themes and identify their research topics based on the corresponding course content.



Session 1: Survey of Mathematics

(Knowledge of calculus is recommended, but not required.)

July 6th, 2025 - July 19th, 2025

Themes:

1. From Number Theory and Special Relativity to Game Theory
2. Applications to Economics

Subjects Covered:

- Number Theory
- Group Theory
- RSA Encryption
- Game Theory
- Estimating Pi
- Complex Numbers
- Quaternions
- Topology of Surfaces
- Introduction to Differential Geometry
- Collective Decision Making
- Survey of Calculus
- Applications to Economics
- Statistics and the Central Limit Theorem
- Special Relativity

Session 2: Survey of Advanced Mathematics

(Knowledge of calculus is required. Knowledge of multivariable calculus is recommended, but not required.)

July 20th, 2025 - August 2nd, 2025

Themes:

1. From the Generalized Stokes Theorem to Ordinary Differential Equations
2. Partial Differential Equations, Including an Introduction to General Relativity

Subjects Covered:

- Survey of Multivariable Calculus
- Advanced Applications to Economics
- Differential Forms
- Fourier series
- Ordinary Differential Equations
- Partial Differential Equations
- Complex Analysis
- Fractals
- Discussion of Lie Groups
- Introduction to Geometric Analysis
- Calibrations and the Simons Cone
- Geometric Flows
- Introduction to General Relativity

Course → Structure

1. Main Lectures:

Prof. Hubert Bray instructs students on the two main themes in each session of the math camp. The lectures adopt Duke University's collaborative group-learning model, immersing students in an authentic university classroom environment as they learn fundamental mathematical knowledge and theory.

2. Guest Lectures:

Each day, guest mathematicians give lectures on advanced mathematical concepts or their current research, providing students with insights into cutting-edge mathematical research.

3. Team Time:

During "Team Time," camp counselors begin with mini-lectures to review and clarify key concepts from the day's Main Lecture. Students then split into groups of six, each led by a counselor, to engage in discussions, work through problem sets, and apply theoretical knowledge. Team Time sessions emphasize collaborative learning, helping students deepen their understanding of the material and hone their problem-solving skills in a group setting.



Faculty and Guest Speakers



Faculty:



Hubert Bray, Ph.D.

Professor of Mathematics, Duke University

- Fellow of the American Mathematical Society (AMS) Inaugural Class, 2013
- Sloan Research Fellow, 2001
- Recipient of a Bronze Medal, International Mathematical Olympiad (IMO), 1988



Clark Bray, Ph.D.

Associate Professor of the Practice of Mathematics, Duke University

- Supervisor of First-Year Instruction (SFI) of Mathematics, Duke University
- Author of the book *Multivariable Calculus*
- Head Counselor of SUMaC and designer of the program's algebraic topology course, 2001

Previous Guest Speakers:



Robert Bryant, Ph.D.

Phillip Griffiths Distinguished Professor of Mathematics, Duke University

- President of the American Mathematical Society (AMS), 2015–2016
- Fellow of the American Mathematical Society (AMS), 2013
- Fellow of the National Academy of Science (NAS), 2007
- Fellow of the American Association for the Advancement of Sciences (AAAS), 2002
- Sloan Research Fellow, 1982



Paul Stephen Aspinwall, D.Phil.

Professor of Mathematics, Duke University

- Invited Speaker, International Congress of Mathematicians (ICM), 1998
- Sloan Research Fellow, 1999



Kirsten Wickelgren, Ph.D.

Professor of Mathematics, Duke University

- Fellow of the American Mathematical Society (AMS), 2023

Previous Counselors:



ELIZA MILER

Eliza Miler is a Durham native and a rising senior majoring in physics and minoring in philosophy. She plans to attend graduate school for some combination of physics, philosophy, and neuroscience and can see herself pursuing a career in theoretical physics or neuroscientific research. Eliza is also a dancer and a HIIT instructor, and loves engaging in any form of physical activity from ballet to baseball. In her free time, Eliza enjoys reading about the wonders of nature, fostering profound Conversations, and playing the card game SET.



PATTON GALLOWAY

Patton has represented the school in numerous academic mathematics competitions and has received awards. Currently, Patton is pursuing a dual degree in Mathematics and Computer Science at Duke University. While at school, Patton serves as a mathematics tutor, accumulating over 150 hours of tutoring experience.



HANNAH MEKARU

Hannah is a rising junior majoring in biomedical engineering with a minor in mathematics. She plans to attend graduate school and ultimately pursue a career within the medical device industry. Hannah has been a mathematics teaching assistant for two years and loves seeing students gain confidence in their problem-solving skills. Outside of classes, she enjoys playing soccer, watching *Jeopardy*, and singing pop songs while driving on the highway.



TUAN DOLMEN

Tuan Dolmen is a senior at Columbia University, where he is double majoring in Mathematics and Physics. Next year, he will begin his doctoral studies at Duke University, specializing in mathematical relativity. Beyond his scholarly pursuits, Tuan finds fulfillment in various extracurricular activities, including playing the guitar, reading philosophical texts, and practicing Brazilian Jiu-Jitsu. Committed to education and community engagement, he has volunteered as a teacher for fourth and fifth-grade students and served as a tournament coordinator at local FLL Lego competitions, nurturing creativity and critical thinking in young minds. Currently, Tuan enjoys sharing his passion for mathematics as a teaching assistant in college-level courses.



PETE CROWLEY

Pete is a rising sophomore at Duke majoring in math and computer science. He is still undecided about his plans after college, but is considering going to graduate school in one of those two fields. He is also a part-time tennis instructor and competes on Duke's club team against other schools. In his free time, he enjoys sports, chess, puzzles, and watching TV shows with friends and family.



ELIZABETH FEIN

Elizabeth is a rising sophomore intending to major in mathematics, biology, and/or chemistry. She is incredibly passionate about learning and teaching math. In addition to more than six years of private tutoring experience, she enjoys creating instructional calculus videos on YouTube and collaborating with others on difficult math problems. Beyond her academic pursuits, Elizabeth enjoys playing violin in Duke Symphony Orchestra, baking tasty desserts, and watching movies with friends.



WILLIAM BRAY

William, Professor Bray's son, will be a mathematics and physics double major at Duke. William has a passion for learning and sat in six math courses at Duke as a high school student. He also loves sports, especially basketball, and enjoys coaching his two youth basketball teams.



LILI ORCHARD

Lili is a rising junior from London, majoring in mathematics and physics. As a Robertson Scholar, she is a student at both Duke University and the University of North Carolina at Chapel Hill and hopes to pursue graduate studies in theoretical physics. Her favorite topics include differential geometry, general relativity, and cosmology, which will be the focus of her research in Chile this summer. She is a music fanatic who loves listening to any genre, as well as playing the guitar, piano, and singing. Additionally, in her spare time, she enjoys dancing, playing tennis, and discussing anything related to physics and philosophy.

→ Program Outcomes

1. 5-10 page Mathematical Research Paper



2. Program Completion Certificate, co-signed by KSE Global and NCMC program faculty



* Saint Mary's School

3. Program Evaluation Letter, completed by NCMC program faculty



Extracurricular Activities



In addition to the academic schedule, a variety of extracurricular activities are available each afternoon for students to choose from. Full-cohort group activities may include museum visits, North Carolina city tours, Duke University campus tours, and a math-themed treasure hunt. Small-group activities are also available, such as board games, swimming, frisbee, basketball, and indoor volleyball.

2025



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Previous Activities:

- Table Tennis, Board Games, Chess



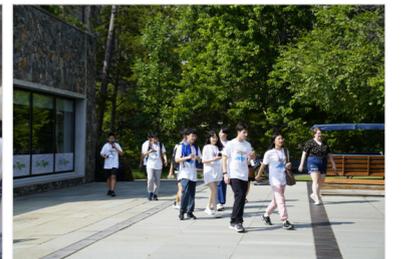
- Weight Training, Volleyball, Basketball



- Scavenger Hunt



- Duke University Campus Tour



Meals & Accommodation



Students are housed in the Smedes Hall student dormitories at Saint Mary's School in Raleigh, North Carolina. Camp counselors live in the dormitories with students to ensure the students' safety around the clock. The dormitories are spacious and well-equipped, providing access to Wi-Fi and recreational facilities, and are within walking distance of the classrooms.

The facilities at Saint Mary's School are comprehensive, offering a variety of options to ensure students have a well-rounded experience. These include a library for quiet study, tennis courts, a football field, basketball courts, a weight training room, a dance studio, ping-pong tables, and a swimming pool. These amenities help students stay active and engaged throughout their stay on campus.

The program fee also includes three meals per day throughout the duration of the program, provided by the Saint Mary's School dining facilities.



* Smedes Hall student dormitories at Saint Mary's School in Raleigh, North Carolina.

Application Requirements & Deadlines

To learn more about admission requirements and submit an application, please visit ncmc.master-scholar.com

Eligibility Requirements:

- High school students and undergraduate college students, aged 15–19, are eligible to apply.
- Participants must be at least 15 years old at the start of the program.

Application Requirements:

- **Application Form**
Applicants must complete the program application form, upload supporting documents, pay the application fee (\$20), and submit an application prior to the submission deadline.
- **Academic Records**
 - High school transcript containing all available grades starting from 9th grade (or the equivalent of the U.S. 9th grade) to the present.
 - Transcripts must be in English or come with a translation. International students not graded according to the U.S. grading system should provide a grading key with the transcript.
- **Personal Statement**
Submit a 250–500 word essay responding to the following prompt:
MasterScholar programs are rigorous, hands-on summer academic programs designed for high-achieving students. Please share what attracted you to the MasterScholar North Carolina Math Camp, and what you hope to gain from it.

- **Math Problems**
Applicants will be required to solve math problems designed by NCMC program faculty. More information about the math problems will be provided in the application form.
- **Recommendation Letter**
Provide a signed recommendation letter from a mathematics or science teacher.
- **English Proficiency Requirement**
International students (those who are not citizens or Permanent Residents of the United States) must provide proof of English language proficiency. Please visit the MasterScholar website (master-scholar.com) to learn more about the English Proficiency Requirement.

Key Dates & Deadlines:

- **Applications Open:** 11/1/2024
- **Early Action Applications:**
 - Submission Deadline: 2/20/2025
 - Decisions Released: 3/1/2025
 - Deposit Payment Deadline: 3/8/2025
 - Full Program Fee Payment Deadline: 4/1/2025
- **Regular Decision Applications:**
 - Submission Deadline: 4/30/2025
 - Decisions Released: 5/15/2025
 - Deposit Payment Deadline: 5/22/2025
 - Full Program Fee Payment Deadline: 5/26/2025
- **Program Dates:**
 - Session 1: July 6th, 2025 – July 19th, 2025
 - Session 2: July 20th, 2025 – August 2nd, 2025



Program Fees ↘

Contact Information ↘

Fee	Cost	Notes
Deposit Fee	\$650	This non-refundable deposit fee secures a participant's spot in the NCMC program, and is applied toward the overall program fee.
Program Fees	\$6,500	Program fees cover: Accommodation and meals, teaching and course materials, and administrative services.



- **Email:** contact@ksedu.co
- **Website:** ncmc.master-scholar.com



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