

SUMMER SESSION

Courses



Duke Summer Academy for High School Students provides a stimulating and thought-provoking learning experience that will help you understand what it means to be a global citizen. You will choose one course from five options (below), with each option providing a unique and global perspective of citizenship. Rather than sitting at a desk and simply listening to a lecture while taking notes, you will engage in a variety of interactive assignments designed to build critical skills essential to preparing for the world

beyond high school. You will participate in role playing, discussions, interviews, debates, and other dynamic educational activities while learning alongside peers from around the world. Summer Academy meets Monday through Friday for approximately six hours a day for classroom activities. Additional optional enrichment activities are planned for evenings and weekends.

The Global Leader

The world is changing at an unprecedented rate. New technologies continue to proliferate and, with this, the world is becoming smaller and smaller. While such developments yield undeniable benefits and exciting possibilities, they often unearth and give rise to challenging local and global problems. Perhaps now more than ever, the world needs leaders and diplomats, people with the knowledge, skills, courage, and commitment to develop innovative and transformative solutions to today's pressing issues.

Over a period of three weeks, you will engage with Chade-Meng Tan's seminal masterpiece *Search Inside Yourself* and be formed into the leader and diplomat the world needs. In a dynamic classroom environment, you will simultaneously learn about and learn to embody effective leadership through various hands-on activities. The course is designed around the Social Change Model of Leadership Development and has three main foci: Self, Group, and Community.

The first part of the course is designed with a single goal in mind: to transform you into an inspirational leader whom others will want to follow enthusiastically. It begins with introspection, a foundational component of leadership development that stems from Sim Sitkins' and Allan Lind's key insight in "The Six Domains of Leadership" that each individual possesses unique gifts and qualities that can be honed to make one an effective leader. You will

investigate an array of individual skills to discover your signature strengths and distinct style of leadership. The course then builds upon this foundation by introducing and helping you develop an array of invaluable skills and qualities drawn from Rob Goffee's and Gareth Jones' "Why Should Anyone Be Led by You" that are inextricable from effective leadership: emotional regulation, authenticity, self-mastery, self-awareness, mindfulness, and self-compassion. You will then use and build upon these to develop group-level skills. Group-level skills are fundamentally incorporative in nature, entailing empathetic listening and captivating public speaking, and together work to unite people and move them forward by cultivating a mutual understanding, vision, and passion.

The course then takes an exciting turn. In its second section, you will put all of the skills you learned into practice in the high-stakes arena of international diplomacy. You will first be introduced to a variety of principles that undergird the disciplines of international relations and comparative politics and then will work together to create countries with unique histories, people, and challenges. Your class will then be presented with a variety of international crises. As these arise, you will work together with your team to develop a holistic and encompassing approach to these conflicts. Such an approach will incorporate not only the shrewd utilization of the political principles you will have recently learned, but also the leadership skills you developed in the first part of the course. Taken all together, this component of the course will provide a wide-ranging introduction to comparative politics and international relations while affording you the opportunity to develop the skills of debate, public speaking, collaboration, negotiation, and political analysis.

Throughout this course, you will not simply be learning a discrete set of skills; you will experience a personal transformation and emerge from this course brimming with self-confidence and changed in profound ways.

Be what the world needs – find the leader and diplomat inside yourself this summer.

The Global Giver (Closed)

Philanthropy, the love of humanity, is at the core of the Global Giver. It is a passion that we relentlessly pursue to make our community and, ultimately the world, a better place. Accordingly, philanthropy is about action. It is something anyone can do. And yet, due to a pair of obstacles, many are unable to pursue their philanthropic interests.

The first obstacle is time. In your fast-paced world you are simultaneously focused upon achieving academic excellence while participating in dozens of clubs and extracurricular activities. It is difficult to find time for community service, no matter how passionate you are about philanthropy.

The second obstacle is the invisibility of opportunity. Community service opportunities are often difficult to find. And when you do find them, how can you know which efforts will best utilize your individual strengths?

Our Global Giver course is designed to help you overcome these obstacles and change the world not only by providing you with myriad community service opportunities, but also

equipping you with the tools and know-how to operate large-scale philanthropic organizations. It does so by synergistically coupling hands-on community service work with a rigorous classroom environment. Your days will begin with trips into the City of Durham and its surrounding area, completing various community service projects, and meeting with community change agents who have leveraged personal strengths, expertise, and inspiration to make the world a better place. You will then move into the classroom to catalyze your growth as a philanthropic leader and to learn about the operation and structure of these organizations. This component of the course will begin introspectively. You will identify your strengths and talents and learn how these can best be utilized to address community needs. Next, you will learn about philanthropy and the way in which organizations strive to optimize their resources to make a positive impact in communities. This work will entail the development of organizational analyses of community service sites, learning about defining problems, identifying local needs, evaluating services, and measuring outcomes. The course will conclude with an exercise in advocacy. You will compete against your peers and make a pitch in front of a funding body advocating for a donation to the community service organization of your choice.

By the end of the program, you will have performed a total of 60 hours of community services across three weeks and earned the Mayor's Service Award, a striking demonstration of commitment to services that could potentially differentiate you from your peers in the college application process. Furthermore, you will have honed your individual strengths and been introduced to the complex structure of philanthropic organizations, making it possible for you to become an agent of change.

Check out some of our past students' reflections [here](#), [here](#), and [here](#).

Experience the reward that comes with giving back to others and gain the skills critical to making the world a better place by participating in Duke's Global Giver program this summer!

The Global Researcher

So you have an interest in science? Perfect! Take a second to think about this: do you know what it truly means to be a scientist? And, further, do you know how to maximize your experiences as a budding scientist?

Science is not a collection of facts to be memorized, but rather science is a way of thinking about the world around us. Scientists are confronted with complex problems every day, such as finding ways to produce vaccines to stop public health crises, or developing therapies to restore sight. Scientists can only solve these problems if they have built up the skills needed to do so, the proposed solutions are approved by their scientific peers, and the accepted solutions are adopted by the people they are trying to help.

Through Duke's Global Researcher program, you will gain the fundamental skills required to begin thinking like a scientist and contributing to discovery.

This course is designed to inform you about the wide range of research being conducted in the biological and biomedical sciences at Duke University, from genetics and evolution to pharmacology and neurobiology. In addition to learning about pioneering research, you will

acquire skills to navigate the process of becoming a scientist through the discussion of topics such as mentoring, ethics, scientific communication, and discovering your scientific passion. Because science is highly collaborative, you will work in teams to process and understand the scientific literature. Along the way, you will learn how to develop and experimentally question a hypothesis, critically evaluate research outcomes, and develop strategies for translating science into action that will lay the foundation for scientists' role as global citizens. We will have frequent guests – including faculty, postdocs, as well as undergraduate and graduate students – who will participate in discussions about their research, but more importantly who will share their stories about how they became passionate scientific researchers. You will also have an opportunity to tour Duke's world-class laboratories and visit research labs in the private sector.

For your culminating class project, your team will develop a research question, generate a hypothesis in response to this question, and formulate rigorous methodologies to test your hypothesis. Your team will then communicate its research strategy and findings to scientists from Duke and their peers from around the world via a poster presentation on the final day.

Tomorrow's researchers will solve some of the most pressing social and scientific problems. Could one of those researchers be you?

The Global Technology Entrepreneur

Join the global community of technology entrepreneurs and revolutionize your life!

Technology has rapidly become the global economic driver of the 21st century, and the tools to launch technology-based companies are becoming increasingly accessible. Facebook was launched from a Harvard dorm room. Apple Inc. was launched from a Palo Alto garage. It is no longer necessary to have millions of dollars of infrastructure to create a great technology company. All you need is the right mindset, a good idea, and the entrepreneurial skill-set to make it succeed.

For students, being an entrepreneur can be a life-changing experience. Whether you decide to move forward starting your own business or decide to take your new-found skills elsewhere, learning the entrepreneurial skill-set will have a profound impact on your future. Today's young entrepreneurs have the freedom to pursue their own passions in ways previous generations never thought would be possible. Support networks around the globe offer resources and opportunities to help kick-start innovative businesses, and Duke University's Tech Entrepreneur Summer Academy provides high school students with a unique launch-pad into this community of young change-makers.

Through the Technology Entrepreneur Academy you will learn the critical business, marketing, and communication skills that are necessary to create a successful entrepreneurial venture. In addition, you will complete your own technology-based business project to test your skills in a hands-on "pitch your idea" competition.

You will learn how to identify the challenges, understand the marketplace, and develop the skills needed to turn an innovative technology idea into a global brand, but what you do with those skills will be up to you. Will you make the commitment to becoming the next great young

entrepreneur? The Technology Entrepreneur Academy will put you on the path, but the desire and drive to change the world must be your own.

The concepts you will learn in this course have been refined through years of study, research, and practical use by leading entrepreneurs from Silicon Valley. This course uses a three-part structure to help you identify and practice the critical skills required to be a successful technology-based entrepreneur:

Defining the Business;
Understanding the Market; and
Communicating the Value.

In the first week you will learn about the complexities in structuring a start-up enterprise using the Business Model Canvas as your guide. In week two you will dive into the details of understanding your market, your customers, and your business partners that are needed to make your products thrive. In the third week you will learn from leading entrepreneurs how to refine your business plan, engage in product marketing, and make compelling presentations.

Throughout the program, you will be introduced to Duke's young entrepreneur community through visits to local businesses and guidance from mentors at the "Bullpen," Duke University's own incubator program for young entrepreneurs. You will also learn from seasoned professionals around the globe through virtual interviews and presentations.

Finally, to conclude the program, you will have the opportunity to pitch your technology start-up for awards and recognition in the Technology Entrepreneur Pitch Competition to help move your project forward beyond the bounds of the academy.

Are you ready to test your hand at creating the next big technology app? Are you prepared to take the plunge into the exciting world of entrepreneurship? If you are, apply soon for Duke University's Technology Entrepreneur Academy.

The Global Mathematician (Closed)

In recent decades, an explosive synergy between biology and mathematics has greatly enriched and extended both fields. Due to its ability to reveal otherwise invisible worlds in all kinds of biological systems, mathematics has even been called the "new microscope in biology."

This course, Applications of Mathematics to Physiology and Medicine, offers you the opportunity to be introduced to and gain first-hand experience with the kinds of mathematical tools and techniques used to approach trailblazing biological questions. The course will cover, among other topics:

The dynamics of infectious disease spread and the role of vaccines in establishing herd immunity and promoting disease eradication.
The electrophysical basis of synapse firing and nerve impulse transmission.

How mathematics can be used to support or rule out mechanistic hypotheses for disease origins, in particular including hematological disorders involving large and dangerous periodic fluctuations in blood cell counts.

Key physical principles underlying Magnetic Resonance Imaging (MRI).

Circadian oscillators and the asymmetry of east-west jet lag.

How mathematics can illuminate and unite seemingly-conflicting theories on cellular differentiation pathways.

The epigenetic landscape and its impact on development and disease progression.

The role of mathematics in predicting patient outcomes in cancer therapy and in revealing new directions for potential advances in research.

Additional topics may be explored depending on student interest.

Lectures addressing the topics above will be combined with a hands-on laboratory component where you will collaborate in a small group on a research project of the group's choosing (with guidance from the instructor). You will also be guided through hands-on skills labs on data analysis and visualization to help you progress in your research. During the final week of the course, you will learn how to draft a technical report which thoroughly describes the goals and outcomes of your research, and each group will give a lecture on its research accomplishments.

A number of guest lectures will be given by renowned professors and researchers who work at the cross-section of mathematics and medicine. You will have the opportunity to discuss your scientific ideas and also your future career plans with researchers at all levels in this new and growing field, from undergraduate students, to graduate students, to postdoctoral researchers and full professors.

By the time you complete this course, you will have developed skills in creating and working with analytical tools to solve problems, while also learning to effectively communicate mathematical concepts and ideas to a broad and interdisciplinary audience. Welcome to Applications of Mathematics to Physiology and Medicine and your first steps into becoming a Global Mathematician.
