



2016-17 Churchill Scholars

For the first time, the Winston Churchill Foundation of the United States was able to appoint 15 Churchill Scholars this year, thanks to a matched-funding initiative from a former Scholar and generous giving from Churchill Scholar alumni, Trustees, and friends.

The 15 Scholars below were selected from a field of 91 nominations by our Participating Institutions. Of those nominations, 31 were women, 14 were from liberal arts colleges, and 27 were for Part III of the Mathematical Tripos. There were nine successful female applicants, which is a record.

The clear trend this year was for large state institutions. Only three winners were from private research universities (CMU, MIT, and Stanford), and the rest came from public institutions. The University of Arizona and Ohio State University both produced two Churchill Scholars this year. Unusually, there were no awardees from liberal arts colleges. This was the first year that students from the University of Utah and North Carolina State University won the competition.

Of the winners, 10 held Goldwater Scholarships, three won Astronaut Scholarships (two Churchill Scholars won it twice), and all had a GPA of at least 3.95. The competition seems to get fiercer every year.

Chun Man Chow	UC-Berkeley	MPhil, Advanced Chemical Engineering
Alexis Crockett	Ohio State University	MPhil, Physiology
Mithi Alexa de los Reyes	NC State University	MPhil, Astronomy
Kara Fong	Stanford University	MPhil, Materials Science
Ramya Gurunathan	Penn State University	MPhil, Scientific Computing
Blake Hauser	University of North Carolina	MPhil, Zoology
Jillian Jaycox	Carnegie Mellon University	MPhil, Medicine
Lisa Jones	US Military Academy	MASt, Pure Mathematics
Reuben Saunders	MIT	MPhil, Chemistry
Travis Sawyer	University of Arizona	MPhil, Physics
Sammy Shaker	University of Minnesota	MPhil, Materials Science
Mackenzie Simper	University of Utah	MASt, Pure Mathematics
Henry Tran	Ohio State University	MPhil, Scientific Computing
Jean Wilkening	University of Arizona	MPhil, Earth Sciences
Karl Winsor	University of Michigan	MASt, Pure Mathematics

Chun Man Chow



HOMETOWN

Hong Kong

INSTITUTION

UC-Berkeley

(BS, Chemical Engineering, Environmental Engineering Science)

TO STUDY

MPhil, Advanced Chemical Engineering

Department of Chemical Engineering and Biotechnology

Through his experience growing up in the polluted city of Hong Kong and frequent interactions with nature as a Boy Scout, Chun Man developed a strong interest in the environment. He has field-tested low-cost water treatment systems in West Bengal, India, he designed and built a portable arsenic remediation testing system, and he has worked on rechargeable batteries for electric vehicles at the Argonne National Laboratory in Illinois.

At Cambridge, Chun Man will work with Dr. David Fairen-Jimenez in the Adsorption & Advanced Materials Lab to use molecular simulations to identify optimal metal-organic-frameworks (MOF) for natural gas storage and analyze the materials' stability. The implementation of MOF-based adsorbed natural gas systems can save costs and reduce energy and environmental impact in natural gas storage and transport.

Chun Man was awarded the Goldwater Scholarship, Tau Beta Pi Scholarship, and the SCI (Society of Chemical Industry) Scholar award. He won the Regents' and Chancellors' Scholarship for exceptional matriculating undergraduates and the Cal Alumni Association Leadership Award for students demonstrating innovative and motivational leadership. He won the first place prize for his poster presentation at the Berkeley Energy and Resources Collaborative Innovation Expo in 2013. He has a 4.0 GPA and has attained 21 A+ grades so far.

At Berkeley, Chun Man was co-president of the Bay-Area Environmentally Aware Consulting Network, through which he performed life-cycle analyses on pulp and plastic packing materials for a local packaging firm. Among his outreach and community volunteering work, Chun Man taught English in Japan and worked with orphans. Chun Man will focus his future work on water treatment technology and pollution control.

Alexis Crockett



HOMETOWN

Macedonia, Ohio

INSTITUTION

Ohio State University
(BS, Neuroscience, Psychology)

TO STUDY

MPhil, Physiology

Department of Physiology, Development and Neuroscience

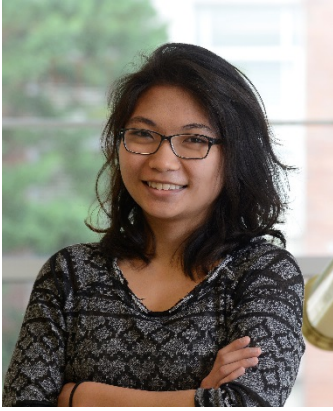
Alexis' research focuses on the link between the immune system and the brain, particularly as it relates to stress and depression. At Cambridge, she will work with Dr. Milka Sarris on the peripheral immune system, which seems to play a key role in depression.

A double-major in neuroscience and psychology, she is one of very few students to have taken almost every neuroscience course offered at OSU. As a sophomore, Alexis became a lab assistant in her professor's lab which looked at ageing. There, she took the initiative to design an independent study that investigated the neural mechanisms underlying depression. Other work in the lab led to a presentation to the Society for Neuroscience and two co-authored papers in the *Journal of Neuroinflammation*.

Alexis came to OSU with an Eminence Fellowship, which recognizes outstanding leadership, service, and academics. In addition to several academic awards and scholarships at OSU, she won the Goldwater Scholarship. As a DAAD RISE Scholar she studied potential biomarkers of depression at Friedrich-Alexander University, in Erlangen, Germany. Her transcript is perfect with the exception of a single A-.

Alexis has worked as a volunteer with Alzheimer's patients and with visitors to a mental health hospital. She has also worked with local school children, promoting the STEM disciplines and helping prepare students for college.

Mithi Alexa de los Reyes



HOMETOWN
Raleigh, North Carolina
INSTITUTION
North Carolina State
(BS, Physics, Mathematics)
TO STUDY
MPhil, Astronomy
Institute of Astronomy

Mithi Alexa “Mia” de los Reyes has long been fascinated by galactic formation and evolution. At Cambridge, she will work with Professor Robert Kennicutt, co-author of the Kennicutt-Schmidt law of star formation. Together, using a vastly larger dataset than previously available, Mia and Professor Kennicutt will re-examine the Kennicutt-Schmidt law and work to resolve some outstanding discrepancies in the law.

The first-ever Churchill Scholarship recipient from NC State, Mia started her undergraduate career with a Park Scholarship, which recognizes academic accomplishments, service, leadership, and character. She won a Goldwater Scholarship and is one of two Churchill Scholars in this class (along with Travis Sawyer) to be among the very few students who have won an Astronaut Scholarship twice. She carries a GPA of 4.0 including 15 A+ grades.

Mia held an NSF REU summer internship at the Space Telescope Science Institute that led to a first-author publication in the *Astronomical Journal* and an oral presentation (when she was still a sophomore) at the American Astronomical Society. As a follow-up to this study, she went on an observing run at the Keck Telescope in Hawaii. She spent two summers at CERN working on the NA62 experiment, where the algorithms she wrote proved to be faster and more cost-effective than approaches that had been developed by other groups over a number of years.

Mia co-founded a math and science club that brings non-traditional science topics into local high schools. She has served as president of a hip hop dance club and participates in rock climbing competitions.

Kara Fong



HOMETOWN
Highlands Ranch, Colorado
INSTITUTION

Stanford University
(BS, Chemical Engineering)

TO STUDY
MPhil, Materials Science
Department of Materials Science and Metallurgy

In an age of wearable devices, there is an increasing demand for stable, low-cost, flexible, light-weight energy storage. Kara will work with Professor Stoyan Smoukov in the Active and Intelligent Materials Lab to look at polymer-based supercapacitor electrodes.

Kara has earned 25 A+ grades from eight different departments so far in her undergraduate career and has earned numerous academic prizes. She won a Goldwater Scholarship and a DAAD RISE, which brought her to the Jülich Research Center in Germany to work on fuel cell-based power systems. At Stanford, she designed a technique for direct quantification of the hydrogen and oxygen products of water splitting, which continues to be used by others in the Jaramillo Research Group. She continues to work in this lab for her honors thesis on electrocatalysts, which has already won an award for an outstanding research proposal.

Through the Tau Beta Pi honor society, Kara is dedicated to mentoring and tutoring. She also volunteers to teach English as a second language to Spanish-speaking staff members at Stanford. Her interests include the cello, juggling, and unicycling.

Ramya Gurunathan



HOMETOWN
Yardley, Pennsylvania
INSTITUTION
Penn State University
(BS, Materials Science and
Engineering/Nanotechnology)
TO STUDY
MPhil, Scientific Computing
Department of Physics

In a summer internship in Japan, Ramya designed computer models to study a material used in electric vehicles, and at the US Department of Energy's Lawrence Berkeley Laboratory, Ramya developed a robot into a tool for the high-throughput discovery of nanoparticles. Ramya has also spent time at Leiden University in the Netherlands in the Superconducting and Ferromagnetic Materials Group. These experiences inspired her to study scientific computing at Cambridge, which is a center of innovation in the burgeoning field of materials informatics.

Ramya's proposed work in Cambridge is on "high-throughput computational determination of multi-component phase diagrams," which can be incomprehensible for non-scientists. She has dedicated herself to the dissemination of complex scientific ideas. While acting as the Director of Local Projects for Penn State's Engineers Without Borders, she hosted monthly science workshops for school children at the Discovery Space Museum. She is especially proud of a tour she organized with her graduate student mentor of the Nanofabrication and Materials Characterization facility, where she inspired fourth graders to dream of a career in engineering. Ramya also enjoys mentoring other students, and she worked as a teaching assistant for a materials design course, where most of the students were her classmates. There she helped the students design research proposals that were then submitted to a board of alumni industry leaders. Ramya is a member of Penn State's highly competitive Presidential Leadership Academy, where she helped draft a proposal for curriculum reform.

At Penn State, Ramya founded and led a classical Indian dance team, and she choreographs dances for national competitions. She is also a fan of jazz music.

Blake Hauser



HOMETOWN

Marietta, Georgia

INSTITUTION

University of North Carolina – Chapel Hill
(BSPH, Environmental Health Science, Biology/Chemistry)

TO STUDY

MPhil, Biological Science

Department of Zoology

Looking back at what led her to pursue a research career, Blake points to her experience at a UNC-sponsored clinic in Malawi, where the HIV prevalence is around 15% overall and nearly 50% in some communities. There, she designed and supervised the installation of a hand-washing station in a rural village and worked

with young mothers looking for practical ways to drive down mother-to-child transmission rates. Back in the US, Blake studied the Lassa virus at the Rocky Mountain Laboratories and HIV at her home campus. She already has one co-authored publication and has more in the works.

At Cambridge, Blake will work with Professor Derek Smith, Director of the WHO Collaborating Centre for Modelling, Evolution, and Control of Emerging Infectious Diseases. Professor Smith has developed a mathematical framework for studying the influenza virus through an antigen map, and Blake will pilot this application for HIV.

Blake arrived at UNC with a Morehead-Cain Scholarship, a prestigious four-year academic scholarship awarded for academic distinction and leadership potential. Elected Phi Beta Kappa her junior year, she has a single A- on an otherwise perfect transcript. She was one of only ten undergraduates selected to design and teach an undergraduate course. Her course was titled “The Re-emergence of Infectious Disease: From Cholera to Ebola and Beyond.”

The theme of Blake’s extracurricular activities has been outreach. She has long been involved with a Leadership Training Academy for middle school students with incarcerated parents. And, just like the Winston Churchill Foundation itself, which expanded to 15 Churchill Scholars this year thanks to fundraising, Blake initiated a successful campaign to raise \$30,000 in 2015 to expand the Eve Marie Carson Junior-Year Scholarship at UNC, and as Executive Director of that Scholarship she supervised the selection process. She is also President of her sorority chapter.

Jillian Jaycox



HOMETOWN
West Chester, Pennsylvania

INSTITUTION
Carnegie Mellon University
(BS, Biological Sciences)

TO STUDY
MPhil, Medicine
Department of Clinical Medicine

Jill will work with Professor Ken Smith, Head of the Department of Medicine, to investigate prognostic biomarkers for autoimmune diseases such as systemic lupus erythematosus (SLE) and anti-neutrophil cytoplasmic antibody-associated vasculitis (AAV).

At Carnegie Mellon, Jill won an Andrew Carnegie Society Scholarship, which recognizes academic excellence, volunteerism, leadership, and involvement in student organizations, athletics or the arts. She was a Goldwater Scholar, has earned numerous academic honors and has a 4.0 GPA. Jill was also awarded the Gina M. Finzi Memorial Student Fellowship, given by the Lupus Foundation of America, to support her current research on SLE at the University of Pittsburgh. Jill has co-authored three scientific publications from her previous work on the immune response to fungal pathogens that she conducted at the University of Pittsburgh.

Jill has been an athlete for all four years on CMU's track and cross country teams. She is Co-President of The Triple Helix, an undergraduate-run journal of science, society, and law. She has worked as a student instructor for Physiology (preparing original teaching content), and served as a mentor for new students. She participates in community service through the Circle K club and is a volunteer for the Animal Rescue League of Pittsburgh.

Lisa Jones



HOMETOWN

Chandler, Arizona

INSTITUTION

United States Military Academy
(BS, Computer Science, Mathematical Science)

TO STUDY

MASt, Pure Mathematics

Department of Pure Mathematics and Mathematical Statistics

Cadet Lisa Jones is interested in quantum computing, a theoretical computation system that uses the principles of quantum mechanics and which would pose cyber security challenges if realized. A double major in computer science and math, Lisa looks forward to Part III mathematics at Cambridge, where she will take courses such as category theory, combinatorics, commutative algebra, and representation theory to enhance her understanding of quantum computation and information.

Co-authored publications early in her time as a cadet at the US Military Academy led to an internship for Lisa at the Computational Physics Division at Los Alamos National Laboratory. Her success there, in turn, convinced the Academy to make an exception to its policies and create a first-of-its-kind semester exchange with the National Security Agency, where Lisa was treated as a visiting researcher in the Math Research Group. Then she spent a summer at the Summer Conference on Applied Mathematical Problems (SCAMP) as the only invitee who was not already at least a doctoral candidate, and she plans to return to SCAMP the summer after graduation. The Computing Research Association named Lisa an Outstanding Undergraduate Researcher for 2016.

With multiple USMA academic awards and a GPA above 4.0, Lisa is the cadet-in-charge of the Department of Foreign Languages Piano Program, and she has performed solo as well as alongside winners of the Puccini Foundation opera competition. She is the chairperson of USMA's chapter of the Association for Computing Machinery's Committee on Women in Computing and a member of the Cadet Competitive Cyber Team, which is ranked in the top 10 nationally. She also works as a tutor to fellow cadets.

Reuben Saunders



HOMETOWN
Santa Cruz, California

INSTITUTION
Massachusetts Institute of Technology
(SB, Chemistry)

TO STUDY
MPhil, Chemistry
Department of Chemistry

Reuben started his undergraduate education at Columbia University, where he focused on intellectual history and literature. During his first year, he was inspired by a bioengineering talk and joined a tissue engineering lab, where his work led to his first co-authored publication. He soon transferred to MIT to major in chemistry, and there he has maintained a perfect GPA.

At Cambridge, Reuben will join the lab of Dr. Sophie Jackson, where he will use modern biophysical methods to investigate protein folding and unfolding. This work will build upon research on the cellular machinery for protein degradation that Reuben has conducted in Bob Sauer's lab at MIT. Also at MIT, Reuben has studied the molecular and cellular mechanisms that control regeneration in flatworms.

Reuben was the editor-in-chief of the MIT Undergraduate Research Journal and serves as the president of the MIT undergraduate chapter of the Sigma Xi honor society. He is passionate about conveying scientific ideas to inspire the next generation and teaches science classes to middle school and high school students through MIT's Educational Studies Program. Reuben has won numerous academic awards, including an Amgen Scholarship and the undergraduate writing prize from the MIT history department.

Travis Sawyer



HOMETOWN
Oro Valley, Arizona
INSTITUTION
University Arizona
(BS, Optical Sciences and Engineering/Mathematics)
TO STUDY
MPhil, Physics
Department of Physics

Travis' goal is to make advances in medical optics so that diseases like esophageal cancer can be detected more quickly. Current imaging techniques provide poor contrast for detecting dysplasia (one of the first warning signs of cancer), but Travis proposes to use recent developments in hyperspectral imaging to improve the visual resolution of these anomalies. At

Cambridge, he will work in Dr. Sarah Bohndiek's laboratory as well as with the Cancer Research UK Cambridge Institute.

While an undergraduate, Travis was invited by Professor Robert Erdmann to join his image processing research group. There, he helped design a novel machine learning technique that may help identify tumors, and he started a software consulting business that will allow the public to access image processing software. While working with Erdmann, Travis has also used image-processing techniques to help authenticate a painting attributed to Vincent Van Gogh. Travis spent a summer at the University of Stuttgart working in the Optical Design and Analysis Group to analyze freeform illumination systems using a method called "phase space."

Travis is one of two Churchill Scholars this year (along with Mia de los Reyes) to have received the Astronaut Scholarship twice. He also received the Goldwater Scholarship, and he was a member of the team that designed the winning entry for an infrared imaging system to be sent to Saturn's moon, Titan, to photograph the seafloors. He has many other academic awards and maintains a 4.0 GPA. He has a passion for sharing his knowledge with younger students and the general public, and his demonstrations have reached over 2,000 people this academic year alone.

Sammy Shaker



HOMETOWN
Roseville, Minnesota
INSTITUTION
University of Minnesota
(BS, Chemistry, Mathematics)

TO STUDY
MPhil, Materials Science
Department of Materials Science and Metallurgy

Sammy plans to study phase transitions in metal-organic frameworks (MOFs) in the Cambridge lab of Professor Anthony Cheetham. Sammy began his explorations in the scientific field as a student of the University of Minnesota's Talented Youth Mathematics Program (UMTYMP), where he undertook an accelerated mathematics program. Sparked by an interest in mathematics, he began working on projects in mathematical neuroscience and error-correcting code theory, which led to a single-author publication. He found his passion for chemistry, however, as a high school and college student at the University of Minnesota-Twin Cities. His projects with Dr. Andreas Stein, in the study of silica gardens, porous and layered metal chalcogenides, and MOFs, cemented his interest in chemistry research. Sammy also spent a summer in a biomaterials laboratory studying shears and stresses on a tissue-engineered heart valve.

At the University of Minnesota, only around 5% of those who take introductory chemistry then move up to the Honors General Chemistry course. Sammy was the best student in Honors General Chemistry *when he was still in the 11th grade*. Once he matriculated to the University, he has maintained straight A's in his science courses. Sammy has the unique distinction of being the only student to have ever received a perfect score in every test and assignment in Inorganic Chemistry at Minnesota. In addition to his chemistry scholarship, he has won the Goldwater and Astronaut Scholarships.

Sammy has worked in the Emergency Department as part of a research project in a local hospital, and he founded a student group to promote screening for kidney disease. He looks forward to a career as a materials chemist, exploring novel materials for energy storage and catalysis.

Mackenzie Simper



HOMETOWN
Salt Lake City, Utah

INSTITUTION
University of Utah
(BS, Mathematics)

TO STUDY
MASt, Pure Mathematics

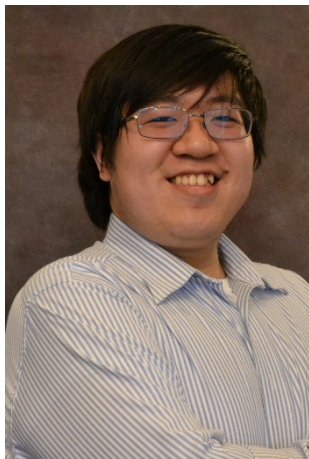
Department of Pure Mathematics and Mathematical Statistics

The first Churchill Scholar from the University of Utah, Mackenzie looks forward to deepening her knowledge of analysis and the foundations of probability in Part III pure mathematics. Mackenzie traces her interests in math to a linear algebra course that was heavily proof-based. This led her to drop her pre-med ambitions and focus on math. She is fascinated by the way inductive reasoning influences other fields of study like organic chemistry and computer science. She is majoring in math with minors in computer science and psychology.

She has participated in several National Science Foundation Research Experiences for Undergraduates (NSF REU), including the study of the Bak-Sneppen model of biological evolution. While completing a summer NSF REU at Brown University, she provided a rigorous proof in the study of dynamical systems with noise. Her current interest continues to be focused on probability and stochastic processes with an eye toward making contributions in the growing field of stochastic partial differential equations (PDEs). Mackenzie is the 2016 winner of the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman.

Mackenzie has a 4.0 GPA and has received numerous awards for academic excellence. She has competed in fencing at the national level, including at the 2012 Junior Olympics, and is also a published writer and poet.

Henry Tran



HOMETOWN

Dublin, Ohio

INSTITUTION

Ohio State University
(BS, Chemistry and Mathematics)

TO STUDY

MPhil, Scientific Computing
Department of Physics

Henry looks to deepen his knowledge of numerical techniques and high-performance computing in the Scientific Computing course before further pursuing his career goal of developing computational methods in electronic structure theory. Describing excited electronic states is fundamental for much of chemistry, but it is often computationally unfeasible. At Cambridge, Henry intends to explore extensions to efficient mean-field-based methods to meet this challenge.

As a first-year undergraduate, Henry joined Professor Terry Miller's spectroscopy lab. He took on the notoriously difficult task of studying nitrate (NO_3), a challenging intermediate in the chemistry of industrial pollution, and produced the first rotational characterization. After giving an oral presentation at the International Symposium on Molecular Spectroscopy his sophomore year, his work caught the attention of Professor John Stanton at the University of Texas, and this project has expanded into a large collaborative effort.

Henry has received several academic awards including distinction as the top student in his class in the Department of Chemistry and Biochemistry his sophomore and junior years and as runner-up at the Bareis Ohio State Mathematics Competition. He won a Goldwater Scholarship, was inducted into Phi Beta Kappa, and has a near-perfect GPA.

Henry has organized fundraising drives and community volunteering activities for local hospitals. He is recognized as a Morrill Scholar for his commitment to diversity-based leadership and he currently serves as a peer mentor for the Office of Diversity and Inclusion and the University Honors Program at OSU to promote engagement in STEM.

Jean Wilkening



HOMETOWN
Tucson, Arizona
INSTITUTION
University of Arizona
(BS, Chemical Engineering)
TO STUDY
MPhil, Earth Sciences
Department of Earth Sciences

Jeannie studies the role of microbial activity in biogeochemical cycling and how various pollutants are transformed and transported in anaerobic environments. While at Cambridge, she will further her research with Dr. Sasha Turchyn and study carbon, sulfur and iron cycling in marshes and their climate implications.

Jeannie has done two National Science Foundation Research Experiences for Undergraduates, one at Princeton University and one at the University of Michigan Biological Station. She has also done two study abroad experiences (in China and Sweden) on sustainable development. Jeannie is the recipient of multiple awards, including the Goldwater Scholarship, the Flinn Foundation Scholarship, and the Thomas R. Brown Scholarship (given to the most promising incoming engineering students at Arizona). Minor in Art History, she has been recognized as the top junior in the Chemical and Environmental Engineering Department and maintains a near-perfect GPA. She is president of Society of Women Engineers, which helps to promote STEM among female undergrads and K-12 girls.

Jeannie credits her success to the influence of great female role models, including her own mother, who was a science teacher in the middle school that both Jeannie and Travis Sawyer attended. Jeannie volunteers as a tutor in math, science, and engineering classes, and she helps recruit students to the Honors College.

Karl Winsor



HOMETOWN

Ann Arbor, Michigan

INSTITUTION

University of Michigan
(BS, Mathematics, Computer Science)

TO STUDY

MASt, Pure Mathematics

Department of Pure Mathematics and Mathematical Statistics

Karl has worked on problems relating to complex dynamics, elliptic curves and their L-functions, and quantum computation. At Cambridge, he would like to advance his understanding of number theory, geometry, and computation.

Karl has completed two National Science Foundation Research Experiences for Undergraduates (NSF REU) at the University of Michigan as well as the prestigious SMALL REU at Williams College. Karl's research at SMALL led to three co-authored publications in number theory and random matrix theory. He is also conducting original research on quantum information and computer science in the College of Engineering.

Karl is pursuing a joint degree in mathematics and computer science through two separate colleges. He is on track to complete this within four years with a perfect 4.0 GPA with 83% of his grades consisting of A+, and the last three semesters consisting almost entirely of senior and grad-level courses. He is a recipient of the Goldwater Scholarship, as well as the winner of several named prizes in the math department at the University of Michigan. He also has a passion for passing on the mentorship and nurturing he received in his youth by volunteering with Math Circle (an outreach math enrichment program) and STEM Society. He is president of the Society of Undergraduate Mathematics Students and plays the mandolin.