Who are they?
Nuclear researchers are professors, scientists, and researchers. They work for universities, corporations, and the government. Some nuclear researchers study the basic principles of nuclear energy, such as how it interacts with matter. Others study how humans use nuclear energy for power generation as well as health and medicine, and how it plays a deterrent role in foreign policy. Nuclear researchers are important to the aerospace industry, where they work with other scientists and engineers to study how nuclear energy can power spacecraft and other important methods of propulsion.

What do they do?
Nuclear researchers use computers, data, and other tools to investigate nuclear energy and its place in our world and society. They are often called to serve as experts and advisors for governments and agencies, helping to establish laws, policies, and best practices for the use of nuclear energy. If a nuclear emergency happens, nuclear researchers will be called in to help determine what happened and develop protocols on how to prevent another emergency in the future. Nuclear researchers may also teach students and future nuclear engineers who will be joining the nuclear workforce.

How do I become one?
Nuclear researchers must have a bachelor’s degree in engineering or chemistry. From there, they go on to earn a doctorate in nuclear engineering. Once they have a Ph.D., nuclear researchers may work as faculty members for universities or for a variety of private and public companies and organizations. Having a strong background in math, science, and computers is essential to becoming a nuclear researcher. Internships are also an important part of gaining hands-on experience and training in nuclear science. Organizations like NASA and the Department of Energy (DOE) are great places to look for internship opportunities.

Spotlight on a real Nuclear Researcher!
Sukesh Aghara, Ph.D., is an Associate Professor of Chemical Engineering and the Director of the Nuclear Engineering Program and the Integrated Nuclear Security and Safeguards Laboratory at the University of Massachusetts, Lowell (UMass Lowell).

Prof. Aghara’s research expertise is the interaction of nuclear energy and matter. He started out as an environmental engineer, but his passion to make lives and communities better quickly led him to study nuclear waste sites and how they
impact the ecosystems around them. He went on to earn a
dotc rate in nuclear engineering and now serves as a faculty
member of the Department of Chemical Engineering at UMass
Lowell. In addition to his academic responsibilities, Prof.
Aghara serves as an advisor and expert on nuclear energy
to many important agencies, including NASA, the Department
of State, and the International Atomic Energy Agency (IAEA).
A word of advice: Prof. Aghara says that aspiring nuclear
researchers should be analytical thinkers who are naturally
curious and have a predisposition to saying “yes.”

Let’s chat with Dr. Aghara!
Tell us about some of the exciting projects and
innovations you have worked on.
What I like most about my job as a university professor is that
I get to choose projects that excite me. It also allows me to
work with the brightest and most motivated young minds.
Two projects stand out for me in all the different research that
I have had the opportunity to be a part of. First, my work at
NASA’s Langley Research Center in Virginia where, as a NASA
Administrator’s Fellow, I had the opportunity to work alongside
the space agency’s top scientists, solving the radiation
transport problems for the International Space Station as well
as lunar and deep-space missions. More recently, I have been
involved in research that is at the cutting edge of technology
and policy, with a focus on security and safeguards of nuclear
materials and facilities. This project has led to tremendous
professional and personal growth for me as I apply my
technical knowledge and develop my communications skills
to engage experts from around the world working on national
and global nuclear security and safeguards challenges. The
effort has stoked the fire in me to continue to be part of an
international community that seeks technology solutions for
the safe and secure use of nuclear energy.

What skills are required in your position on a day-to-day basis?
The use of advanced computational and analysis tools is
fundamental to the work we do in our research group. This
includes using several radiation transport codes running
on multiple OS and hardware platforms. We use MatLab,
Python, and Excel for most of our analysis tools. To be able
to communicate scientific data in a meaningful way to a
broad range of audiences is a skill that I continue to develop
and expand.

What do you do in your spare time?
I grew up playing tennis, and it continues to be something that
I really enjoy, particularly on clay courts. I also enjoy hiking
with friends and family. My wife and I share a passion for food
from around the country and the world. We seek new cuisines
and learn new cultures whenever and wherever we can.

What educational preparation would you recommend for
someone who wants to enter this field?
Science and mathematics are the fundamental building
blocks to any engineering field. Nuclear engineering is by
definition a multidisciplinary field, with nuclear energy being
an engineering system that integrates many core areas
of engineering—chemical, mechanical, civil, electrical,
and computer.

From your experience, how do most people enter this
profession?
Although the typical career pathway is through science and
engineering fields, I have come across some exceptionally
talented nuclear energy professionals who had their formal
education in policy, communication, and history! Internships at
national laboratories and fellowships through DOE and NASA
can offer pathways for a successful career in nuclear energy.

Are there professional organizations or events that teens
and college students can join/participate in?
At UMass Lowell, we host Boy and Girl Scouts for their
merit badges. This is also an excellent way to learn or visit
nuclear facilities in the area. Several high schools also have
radiation science kits, which are a great way to learn about
the fundamentals of nuclear science. The American Nuclear
Society has local chapters that organize public events and are
very receptive to aspiring young members.