ld Your Future With a Career in Engineering

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Engineers Club of Philadelphia Founded in 1877

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Do you like math and/or science? Do you get a sense of satisfaction when you figure out a difficult homework problem? Are you curious about how new technologies and products are developed? Did you ever wonder how a building or bridge or vehicle is built? Do you like working with others? Do you hope to have an interesting, lucrative, and meaningful career one day? If you answered 'yes' to any of these questions, you should consider pursuing a degree in engineering!

Everywhere you look you can see examples of engineering having a positive effect on society and your everyday life. With a career in engineering, you'll not only be involved with exciting projects and opportunities, you'll be giving back to your community as well.

More than 1.6 million engineers work in the United States today, making it the nation's second-largest profession. The average starting salaries for college graduates with an engineering degree are among the highest of all college graduates. Most entry-level engineering positions have annual salaries well above \$50,000, with great potential for growth. Since engineering employment is expected to grow faster than the national employment average, job opportunities will be plentiful.

An engineering degree can also be a gateway to various other career paths. Countless engineering graduates go on to jobs in business, law, medicine and government. To many employers, an engineering degree is the sign of a well-educated, hard-working and valuable potential employee. The problem-solving and analytical skills you will learn in engineering school are essential in so many areas of life.

This special supplement was developed by The Inquirer in partnership with the Engineers' Club of Philadelphia to help you learn about the many opportunities available in the field of engineering. Take the personality quiz to find out if you may make a good engineer, complete the activities to practice skills you would use as an engineer and read bios about interesting engineers in the Greater Philadelphia area. Use this supplement and the many website links within it to explore engineering and see if it is something you might like to do one day. Work with your teachers, counselors, parents, and engineers in your community to make a plan for your future success!

The Engineers' Club of Philadelphia was formed in 1877 to recognize and support the various engineering professions in the area. The Engineers' Club has enjoyed the membership of thousands of remarkable engineers over the years, including Thomas Edison and Herbert Hoover. One of the missions of the Engineers' Club is to promote the advancement of engineering and technology at the pre-college and college levels. We strive to be a resource for parents, educators, counselors, and students. We also provide many scholarships and awards for high school and college students pursuing careers in engineering.

Best Wishes, Bob Wright, PE President, Engineers' Club of Philadelphia The Engineers' Club of Philadelphia and *The Inquirer's* Newspapers in Education department have joined forces to create an informational and interactive supplement that will be sure to get your mind in gear. "Build Your Future" explores the various disciplines of engineering and encourages students to learn more about the masterminds behind projects and products we use every day. Through educational and fun activities, this supplement challenges students to step outside of the box and get in touch with their inner engineer. By exposing and explaining the importance of engineering, students will gain a better understanding of the art of engineering while also raising their interest in one of today's best careers.

If students would like to learn more about the Engineers' Club of Philadelphia and engineering please visit: http:// www.engrclub.org/. For award and scholarship information, please visit: http://www.dvewc.org/awards.php. For individual engineering and technical societies, please check the back page of this supplement.

**Note to Students: While reading through this supplement, take some brief notes on the different types of engineers, or highlight what you find most interesting.

DID YOU KNOW?

According to the National Association of Colleges and Employers' annual survey in 2011, out of the top 10 paying entry level jobs, seven belonged to an engineering field.

ENGINEERING AT A GLANCE

Take a moment to look out of the window, in your desk, and around the room. Chances are you have just seen something that an engineer has created. Engineers are responsible for the roads you drive on, the computers you use, the calculators in your desks, the planes in the sky, the boats traveling across the sea and everything in between.

ACCOMPLISHMENT ACTIVITY Using the list of top 20 engineering achievements in the 20th century, put a check next to each one you use on a daily basis and two checks next to the ones that you have used at some point during your lifetime. Electrification Highways Automobile Spacecraft Internet Airplane Water Supply and Distribution Imaging (X-ray, radar, telescopes, etc.) Electronics Household Appliances Radio and Television Health Technologies Agricultural Mechanization Petroleum and Petrochemical Technologies (oil & gasoline) Computers Laser and Fiber Optics Telephone Nuclear Technologies High-Performance Materials (plastics, ceramics, etc.) Air Conditioning and Refrigeration

Obtained from www.greatachievements.org

BENEFITS

With all of their accomplishments and projects, engineers are highly sought after. Engineering is not only one of the highest paying careers, but one of the most flexible as well. The massive job diversity offers engineers the ability to find their niche within the engineering world. Usually staying out of the limelight, engineers work to better the lives of others while also satisfying their personal curiosity of the world.

You will never become bored if you choose an engineering career. The immense creativity factor in this field enables engineers to make engineering anything they want to make it. Engineers continually work to make a difference and help change the world for the better. Since jobs are so diverse, engineers could have the opportunity to travel all over the world to solve problems and create a better future for those around them. Engineers can work in the field, in an office, or a bit of both. If you want to make a difference and be highly compensated for your work, engineering is definitely a field for you!

The Philadelphia Chapter of Pennsylvania Society of Professional Engineers (PSPE) provides thousands of dollars in scholarships for high school students. Click on the "Scholarships" link at pspe-philly.org for more information.

WHY GET LICENSED?

Like many other professions, getting licensed is a way of showing proof of ability and responsibility in that field. Many educational institutions, government agencies, and private industries are requiring that licensed professional engineers are hired and contracted. Therefore, getting licensed as a Professional Engineer (P.E.) is becoming more and more necessary in the engineering world. Once an engineer is licensed, the doors of opportunity remain open for their entirety of their career. For engineers, even the sky isn't a limit!

DID YOU KNOW?

In 1909 the first baseball stadium was built in Pittsburgh!

CIVIL ENGINEERING

Civil engineers create, invent, design, build and maintain public projects that you see and use every day. Roads, buildings, and the clean drinking water you find in your school and home are just a few of the many products of civil engineers. Civil engineers may work for consultants, private developers, or government agencies. On average, civil engineers have a starting salary of about \$48,500. Here are just a few of the different types of civil engineers:

• **Transportation Engineers** design and build everything that we use to travel, including roads, bridges, pedestrian paths, and traffic signals.

• Water Resources Engineers specialize in treating and distributing water for drinking, cleaning dirty water, and designing pipes, bridges, and dams to effectively route and manage rain-water during floods.

• **Geotechnical Engineers** deal with the soil and rocks below us and study ways to modify unfavorable soil conditions to safely build a road, building, tunnel or other structure.

• Environmental Engineers focus on maintaining and improving our environment.

• **Structural Engineers** study the forces that will be exerted on a structure (snow, wind, earthquakes, water, and people) and design and monitor skyscrapers, bridges, roller coasters, sports stadiums, dams and levees that will safely withstand those forces.

THINK ABOUT IT:

Normally, civil engineers specialize in one or two major disciplines: Transportation, Structural, Water Resources, Environmental, and/or Geotechnical. If you were to become a civil engineer, which of these disciplines would you focus on? Why?



NOW INTRODUCING:

Jeremy Chrzan, PE, PTOE, LEED AP, is a 33-year-old civil and transportation engineer. The letters after his name stand for various qualifications: PE – Professional Engineer, PTOE – Professional Traffic Operations Engineer, and LEED AP – Leadership in Energy and Environmental Design Accredited Professional. Chrzan obtained a B.S. in Civil

Engineering and a M.S. in Civil Engineering from Drexel University, with concentrations in Structural Engineering and Engineering Geology.

Best Part of the Job: I love working in a team with like-minded people who are driven, who challenge me, and who want to improve the world around us. Every day presents a series of new challenges and no two days are ever alike.

Get Your Gears In Motion: Test your engineering skills through fun activities online by visiting: http:// www.asceville.org/just_for_fun.html

Teachers: If you are looking for a fun project opportunity for next year that could win money for your class, here's your chance! Visit http://bridgecontest.usma.edu/ to learn about an interactive bridge design contest with prizes up to \$10,000!

The American Society of Civil Engineers (ASCE) provides scholarships, competitions, and activities for students. The local Philadelphia Section of ASCE awards \$1,000 scholarships to deserving college students annually. For more information, visit: www.asce-philly.org

The Younger Member Forum (YMF) of ASCE works with young engineers to assist in mentoring and networking. The YMF student outreach program visits classrooms to explore engineering principles and career opportunities with students. For more information, visit: www.ymfphilly.org.

DID YOU KNOW? THE ROCKVILLE BRIDGE IN HARRISBURG IS THE LONGEST STONE ARCH BRIDGE IN THE WORLD.



TRANSPORTATION ENGINEERS

Transportation engineering is one of the largest branches of civil engineering. Living up to their title, transportation engineers focus on every type of transportation: air, water, space, rail, and road. With a starting salary of approximately \$50,000 a year, transportation engineers provide solutions to improve existing roadways and work in private engineering consulting firms, state and federal Departments of Transportation, the military, and the Department of Environmental Protection. **Highway engineering** is a branch of transportation engineering. These engineers improve, design and build local bike and pedestrian paths, roads and bridges, interstate highways, and limited access facilities (expressways). There are many different career paths in the highway industry. For those interested in design, you can work for an engineering firm or public agency. In construction, you can work for a contractor that builds roads and bridges or for an engineering firm or public agency as a construction manager.

Women in Transportation

Over the years, women have taken a stronger stance in the engineering field. To help aspiring female engineers, the international organization, "Transportation You" was created. It is an interactive mentoring program that offers girls ages 13-18 an introduction to a wide variety of transportation careers.

Visit www.transportationyou.org for more information and to get involved.

The picture below is a schematic of an intersection. Notice that the major street, assumed in this project to travel east and west (left and right), has more traffic and travel lanes than the minor street, assumed to travel north and south. The number of vehicles in an hour is shown next to each directional arrow. For example, there are 75 vehicles making a westbound right turn from the major street; there are 300 vehicles traveling southbound through the intersection.



NEWSPAPER ACTIVITY:

Look through today's *Inquirer* for an article that has to do with transportation facilities or transportation in general. What type of transportation facility is being discussed? At this intersection, the signal operates with four signal phases:

Phase 1 – The left turns from the major street (eastbound and westbound) onto the minor street Phase 2 – The through and right turn movements on the major street (eastbound and westbound) Phase 3 – The left turns from the minor street (northbound and southbound) onto the major street Phase 4 – The through and right turn movements on the minor street (northbound and southbound)

Given the lane configuration, the directional volumes, and the signal phasing, what percentage of green time should go to each phase? Show your work and explain your answer (less than 1 page). **Go to MASITE.org to compare your answer**

THINK ABOUT IT:

There is a lot that goes into the design of a traffic signal; determining what percentage of time each direction of traffic gets the green light is one piece of it.

Teachers: Check out the recruitment toolbox for activities by topic for each age group at: http://ite.org/councils/education/Recruitment/default.asp Check out the latest Newsletter "MASITE Interconnect" at www.masite.org to read about recent activities and news relating to the transportation industry. Get Your Gears in Motion: Visit http://www.pbs.org/wgbh/nova/bridge/build.html and get in touch with your inner transportation engineer by designing your very own bridge!

MECHANICAL ENGINEERING

Mechanical engineers build things that move or things that have internal components that move. Working in almost every industry imaginable, these engineers are some of the masterminds behind bicycles, toys, computers, cars, planes, and even space shuttles. Mechanical engineers also study and develop new materials which are used in structures and machines, as well as ways to create, store, and transfer energy.

Many times, mechanical engineers work closely with engineers from other disciplines. By working together with other engineers, they are able to create the desired product. Using scientific and mathematic solutions, mechanical engineers are able to design and create various types of systems that we use every day.

HEATING, VENTILATION, AIR CONDITIONING (HVAC)

One of the major areas of mechanical engineering is the technology of indoor and automotive environmental comfort. HVAC engineers work to design the most efficient systems to provide good air quality and thermal comfort. Rising energy costs and increased environmental awareness make this area of mechanical engineering vital in our world (by tabrizan at tf).



NOW INTRODUCING:

Julie Kulik graduated from Penn State University in 2005 with a degree in Mechanical Engineering and a minor in Engineering Leadership Development. Currently Kulik is working for a nuclear power plant company, Worley Parsons.

During College: I got involved in the professional mechanical engineering society, the American Society of Mechanical Engineers (ASME) International, and have learned leadership skills through my volunteer work with ASME at both the local and national level. **Being a mechanical engineer**...has opened up so many opportunities that I could not have imagined as a student.

NEWSPAPER ACTIVITY:

Look through today's *Inquirer* for pictures of things that were designed and created by mechanical engineers. This can be turned into a competition. In three minutes, search the newspaper for these images and either keep a tally of each item found, circle them, or cut them out. Did you find more than your peers? Total Found _____



Get Your Gears in Motion: To get a better idea of how you can get involved and acquire your skills in mechanical engineering, explore these websites: http://www.asme.org/groups/educational-resources • http://www.asme.org/kb/topics/students • http://www.asme.org/kb/topics/teachers---academ

AUTOMATION AND PHARMACEUTICAL ENGINEERING 7

Automation:

If you want to build a career in a profession that helps make a positive difference in this world, automation may be for you. According to the International Society of Automation, "automation is the creation and application of technology to monitor and control the production of goods and services." This field aids our economic future, protects our planet, discovers and creates new innovative technologies, prevents disease, lowers the poverty rate, saves lives, and improves the world in which we live.

Some examples of cool things you could work on in the automation industry include: automated surveillance security, wireless technology, new sources of clean power, fire and safety design, theme park design, pollution reduction, home and industrial automation, and even automated highway systems.



NOW INTRODUCING:

Charles A. Clerecuzio, P.E., CPIP earned a B.A. in Zoology and a M.S. in Chemical and Biochemical Engineering from Rutgers University, followed by a M.B.A. in Finance and Operations Management, from the Stern School of Business, New York University.

I like Engineering Because...Engineering is the greatest job there is! People count on engineers to help solve the world's problems. The impact of engineering spans the environment we live in to the energy we need to the products we use. Engineers take great ideas and help turn them into reality.

Life Motto: "Character means doing the right thing when you know no one is watching."

THINK ABOUT IT:

If you were a pharmaceutical engineer, what sickness, disease or deformity would you focus on finding a cure for? Why?

Pharmaceutical Engineering:

The field of pharmaceutical engineering offers many career options. Pharmaceutical engineers find work in researching new drug delivery systems and drugs, labeling and packaging, facility design, sales, scale-up processes, management, education, and manufacturing. Based on 2010 revenues, six out of the top ten pharmaceutical companies in the world are located in the United States.

Biotechnology:

Biotechnology is a major contributing factor to pharmaceutical engineering and their goals. Using living organisms and/or derivatives of them, biotechs utilize scientific skills and knowledge to create products that will help better the world. Biotechs test the reaction the human body will have to certain drugs in order to ensure safety and accuracy. Biotechnology also deals with other aspects of science such as genetics, biology, agricultural practices, and even cloning!

NEWSPAPER ACTIVITY:

Look through today's *Inquirer* for a story pertaining to new medications, disease, sickness or medical research. What is the article discussing? How would a pharmaceutical engineer be involved?



Get Your Gears in Motion: The International Society of Automation offers additional information to students, parents and educators. If you are interested in learning more about this field, please visit www.isa.org and check out the student page or www.automationiscool.org for interactive games and activities.

Get Your Gears in Motion: Keep up with local and international pharmaceutical breaking news by visiting websites such as www.ispe-dvc.org/ispe.asp?file=chapterhome.txt or www.pharmamanufacturing.com.

OTHER ENGINE

NOW INTRODUCING:

Senior Environmental Engineer Angelo Waters graduated with a B.S. in Environmental Engineering and a M.S. in Engineering Management from Drexel University, and is currently working on the Reading Viaduct, a former railroad facility that is being

transformed into a linear park in Center City Philadelphia.

Describe Your Job: Environmental engineers are usually the "first responders" to any project and provide the necessary information to identify environmental issues, such as wetlands and hazardous materials which will need to be considered in the design of the project. We need to provide accurate, clear, and timely advice that will keep the project on budget and schedule.

Everything around you has been engineered in some way, shape or form. While some engineers design, create, and build skyscrapers, roller coasters, roa and ecologically and environmentally sound devices to help improve our wor



Bioengineering – Through the study of living systems, bioengineers find solutions to a magnitude of our world's problems. Known for eliminating wastes and cleaning up contaminated water and soil, these engineers spend their time finding ways to improve the environment and human health.

> **Chemical Engineering** – Using chemical processes to design and create ways of constructing goods, chemical engineers are responsible for producing plastics, fibers, medicines, semiconductors, paper, paints, fertilizers and even the fuel that powers the cars you see on the roads every day.

Agricultural Engineering – Agricultural engineers come up with resolutions to agricultural issues and challenges. They have helped advance the technologies and techniques used in farming and agriculture. These engineers provide environmental controls and design and implement ways to help protect natural resources.



Computer Engineering – Computer engineers focus on every possible aspect of computers and computer controlled equipment. Computer engineering affects almost every field imaginable. These engineers make computer software, hand held devices, movie animation, and even air traffic control towers a reality.

Construction Management – Construction managers plan, direct, coordinate, budget, and inspect all types of construction projects. They supervise the construction process from the conceptual development stage through final construction, making sure that the project gets completed on time and within budget. They often use sophisticated software and may split their time between the office and construction sites.

THINK ABOUT IT:

After reading through the various engineering disciplines, which can you most relate to? Why does that particular discipline catch your attention? Audio Engineering – Audio engineers center their attention on the creation and improvements of sound. The audio aspects of movies, video games, television shows, and even concerts have all been made possible by audio engineers.



ERING DISCIPLINES

The various disciplines of engineering span across a wide variety of professions. dways, bridges and rockets, others design engines, mobile phone technology, materials, Id. Options are endless for this profession: there is no limit to what engineers can do.



Environmental Engineering - Environmental engineers study ways to preserve and better the environment. Finding efficient and safe ways to clean our beautiful oceans, creating effective air pollution equipment, determining ways to rid toxic wastes, and enhancing and creating new recycling systems are just a few points of interest for environmental engineers.

Geotechnical Engineers - Working closely with the other civil engineering branches, geotechnical engineers analyze and sample ground water, soils and rocks and come up with ways to modify them to provide strong foundations for buildings and bridges.

Industrial Engineers – To provide a service or create a product, industrial engineers look for the most effective ways to utilize machines, materials, information, people and energy. These highly organized individuals use the big picture in order to solve problems and make improvements.



Materials Engineers –In this field, engineers can specialize in various types of materials. One may biomaterials for different medicines. Harnessing their technical and creative abilities, materials engineers can create new and useful products by developing better materials.

NOW INTRODUCING:

Kevin Brown is a 25-year-old Construction Inspector, Graduating from Widener University with a B.S. in Civil Engineering, Brown recently worked on the Gustine Lake Interchange (Kelly Drive and Ridge Avenue) in the Manayunk section of Philadelphia.

Best Decision: My best decision was to go to college. I came very close to not going; in fact I was forced to apply to colleges by my high school counselor.

Success: To come from the inner-city as a student who wasn't interested in furthering his education to having a civil engineering degree, getting my Engineering-In-Training certification, and being able to apply what I learned on my projects has been such a great, rewarding journey.



focus on finding a shock-resistant material to use on running shoes, while another may be working on

NEWSPAPER ACTIVITY:

Look through today's Inquirer for an article pertaining to one of the engineering disciplines on these two pages. Why do you think it is being covered? What is the article discussing?

Mining Engineers – Mining engineers supply raw materials and energy by studying and extracting mineral deposits from the earth, all while also minimizing environmental effects. Mining engineers also design mining and tunneling equipment, the mines themselves, and supervise its operation and construction.





Nuclear Engineers - These highly skilled engineers look for ways to capture and utilize atoms to better everyday life. Water supply, environment and pollution, transportation, health, and space exploration are all points of interest for nuclear engineers.

Water Resource Engineers – From cleaning dirty water and distributing clean drinking water, to providing input in the design of bridges, dams, and pipes, water resource engineers place their focus on the many different aspects of water.



Get Your Gears in Motion: If you would like to learn more about engineering and check out some interactive activities, check out http://eweek.org/Home.aspx or www.discoverengineering.org.

AEROSPACE ENGINEERING

Aerospace engineers create, design, construct, and test spacecraft and aircraft. This discipline of engineering breaks down into two categories; aeronautical engineering and astronautical engineering. Aeronautical engineering concentrates on vehicles that stay within the Earth's atmosphere, whereas astronautical engineering deals with vehicles that go beyond the Earth's atmosphere. The sky isn't the limit for aerospace engineers!

The Future of Aerospace Engineering:

Those who take on the challenges and thrills of becoming an aerospace engineer can be a part of world changing events. In their lifetime, aspiring aerospace professionals are likely to see space colonization, space-based solar power stations, an active search for extraterrestrial life, and the ability to travel to any point on Earth in a matter of hours. What on Earth are you waiting for?

Working as a Team:

Many aspects of aerospace engineering require teamwork. Each project must be designed, built, tested, operated and maintained. Aerospace scientists research unknown areas of aerospace. Business people market new products to meet the needs of customers. Engineers manage engineering development projects. Technicians, logisticians, and mechanics manufacture, build, and maintain aircraft or spacecraft.

Aerospace scientists spend their time exploring the unknown to help different specialty engineers then build what has never been built before. Once the aircraft or spacecraft is built, testing and evaluation is conducted, followed by field service, which includes training, maintenance and service support. All team members must work together to ensure that each project is a success.

THINK ABOUT IT:

In the space provided, design your own rocket or spacecraft. Label each part to indicate its purpose and how it will work. Then give a brief description of your creation. Name of Creation: ______



Get Your Gears in Motion: The American Institute of Aeronautics and Astronautics offers a multitude of information, educational grants and scholarships. Check out the "Education and Careers" section of their site for more information and to get a better feel for this amazing career option: www.aiaa.org

Attention Teachers: If you are a teacher in science, math, or technology, you may qualify for the American Institute of Aeronautics and Astronautics (AIAA) grant of up to \$200 per individual request to supplement your learning program. Use your grant for classroom demonstration kits and science supplies, math and science software, supplies for robotic programs, and other materials to help you make science, mathematics, and technology come alive in your classroom. For more information visit: https://www.aiaa.org/Secondary.aspx?id=4184.

ELECTRICAL ENGINEERING

Electrical Engineers focus their energy on electromagnetism, electronics, and, of course, electricity. Think about everything you use on a daily basis that requires electricity. Electrical engineers are responsible for electric power stations, the lighting and wiring of buildings, telecommunication systems, and everything in between. Among others, computers, instrumentation, signal processing, telecommunications, electronics, microelectronics, power, and control are all considered sub-disciplines of electrical engineering. These engineers design, create, test and monitor electrical devices and systems all over the world. Wherever you see electricity, know that an electrical engineer has helped create that product.



NOW INTRODUCING:

Obtaining a B.S. and a M.S. in Electrical Engineering from Drexel University, Joseph Maida, PE, LEED AP, has traveled all over the United States and other parts of the world through his career as an electrical engineer, and has been the President of his company, Maida Engineering, Inc. since 1978.

Interesting Projects: I worked on the power and controls for the Jurassic Park Adventure Ride, the Sinbad Stunt Show, and Poseidon's Fury in Universal Studios.

NEWSPAPER ACTIVITY:

Look through today's *Inquirer* for an article that deals with something an electrical engineer created. This could be a mobile phone, tablet, lighting, wiring, power, etc. What is it? What is the article's meaning?



THINK ABOUT IT:

Electrical engineers have helped reinvent the world we live in today. Without them, there would be no computers, no video games, and no electricity. Believe it or not, there was a time when all of this did not exist. Pretend there was no such thing as electrical engineering, and none of the products that they were a part of were ever created; this means no social media, no telephones, no microwaves... nothing that uses electricity. Write a few sentences about how your life would change if electrical engineers were not a part of the world. How would you look up information? Communicate with friends and family? Spend you spare time?

Get Your Gears in Motion: If you'd really like to get a taste of electrical engineering, try out some of the fun and creative activities and lesson plans found on IEEE's website www.ieee.org. Once there, go to "Education and Careers," and click "Lesson Plans" under "Pre-University Education Resources." Here you can search for lesson plans according to age and subject. Have fun exploring and learning through these amazing lessons and activities!

NAVAL AND MARINE ENGINEERING

As our environment continues to change, more and more people turn to the ocean for necessary resources, causing careers in naval architecture and marine, ocean and naval engineering to grow. These visionaries design and create innovative ocean and waterway transportation systems to further our exploration and knowledge of the ocean, all while making sure to minimize damage to the ocean and ocean life.

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• **Naval Architects** assume the role of designing and building the frame or structure of watercraft and any type of water transportation device, including: submarines, ships, seaplanes, icebreaker, offshore drilling platforms, and boats.

• Marine Engineers deal with the internal machinery systems and power of the watercraft. These creative and versatile engineers do everything from the lighting and refrigeration to the controls, hydraulics and even the engine.

• **Ocean Engineers** create every process and device, and discover, produce and transport off-shore petroleum, develop new uses for waterways and transportation systems, and create projects including underwater robots, oil rigs, and underwater structures, while also working to protect and conserve beaches and marine life.

• **Naval Engineers** work on one of the world's largest and most multifaceted engineered systems that are vital to our country's national defense, naval vessels. Naval engineers must balance and fit together new technology, electronics, hull design, HVAC, cost, sleeping quarters, propulsion, and much more.

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NOW INTRODUCING:



Malarie Vanyo graduated in 2008 with a Bachelor's degree in Mechanical Engineering from Drexel University, and now works for the Advanced Machinery Systems Interrogation branch at the

Naval Surface Warfare Center, Carderock Division (NSWCCD) – Philadelphia and is a member of the American Society of Naval Engineers (ASNE).

Words of Advice: When you find something that you love doing, try to incorporate that into what you will be studying in college- -it makes things a lot more fun when you're doing work.

Earning a B.S.in Electric and Computer Engineering and a M.S. in Electrical Engineering from Rowan University, Patrick J. Violante works with Vanyo and is also a member of ASNE. **Words of Wisdom:** Studying to become an engineer provides an opportunity for students by not only continuously teaching more advanced math and science to them, but by also allowing them to start applying this knowledge to drive the technology of the future.

CAN YOU FIND THE FOLLOWING WORDS IN THE WORD SEARCH PUZZLE SHOWN HERE?

propulsion system naval engineer hull starboard port drive shaft turbine fore aft frigate destroyer carrier submarine propeller rudder internal combustion deck engine

motor power system bridge gas turbine ship machinery computer virtual reality robotics

THINK ABOUT IT:

Do you know what all of the words in this search mean? If not, look them up and learn how they relate to Naval or Marine Engineering.

Get Your Gears in Motion: Test your skills with naval and marine engineering by experimenting with the activities on http://education.wes.army.mil/clubhouse/science/list.cfm?Topic=boats. These fun and creative experiments are sure to get your creative gears going! Visit seaperch.org and phillyseaperch.org for more information on the SeaPerch challenge. Get Involved: Visit: seap.asee.org to find out about the Navy's Science and Engineering Apprenticeship summer internship for high school students. This 8 week internship gives students the opportunity to work with

Get Involved: Visit: seap.asee.org to find out about the Navy's Science and Engineering Apprenticeship summer internship for high school students. This 8 week internship gives students the opportunity to work with a naval engineer in a Navy Lab, and pays the student \$3,150! For more information on college scholarships provided by these fields, visit: http://www.sname.org/SNAME/Directories/ProgramsResources/Scholarships/ and http://Navalengineers.org/awards/scholarships/Pages/ASNELandingPage.aspx

MILITARY ENGINEERS

Military engineers work to shape different offensive, defensive and logistical structures that help maintain our country's safety. Some of these engineers are taught in military academies while others are civilians. By designing, building, maintaining and even dismantling military works, these engineers make sure our country is at the top of its game. Through strategic support and technical training, combat engineers are those who construct and demolish projects during battle.



NOW INTRODUCING:

After graduating with a B.S. in Systems Engineering from the United States Military Academy, and a M.S. in Engineering Management from Missouri University of Science and Technology, BJ Kraemer came to the Greater Philadelphia Area to

share his knowledge. Currently, Kraemer is a Construction Project Manager for APG BRAC/C4ISR.

Essential Professional Philosophy: Solve problems, learn every day, build relationships, and be a leader when the opportunity presents itself.

Best Part of the Job: Every day brings a new challenge, new people and new opportunities.

Lesson: The more you know, the more you realize what you don't know. No one is the expert in everything and when you realize that, you know you can contribute even as a younger person because you are bringing a different lens to the problem.

Engineering is rewarding because...You get to solve problems every day. Some might be small and others might be big but at the end of the day or at the end of the project, you see progress and feel accomplishment. In the grand scale, we get to be a part of making our nation better. **Advice:** Don't be intimidated. If you are willing to work hard and struggle at times, engineering will open opportunities in every industry. If you are passionate about something, follow it. If you are still trying to figure out what you want to be, engineering will give you a great foundation to be effective in any career path.



Get Your Gears in Motion: The Society of American Military Engineers (SAME) offers summer camps for students as well as different activities, competitions, and scholarships designed to encourage kids to consider a career in engineering, math, science or construction services. Check out what SAME has to offer! www.same.org • www.samephiladelphiapost.org • samecamps.org

Engineering is all around us! The next time you are on a vacation or just out for a drive, ask your parents to check out one of the engineering marvels in our area or across the country: http://www.engineeringsights.org/

EDUCATION SUGGESTIONS

The different disciplines of engineering are as unique as the engineers themselves. There is sure to be an engineering field that would not only utilize your strengths and personality, but would also provide a secure and happy future. Take this short personality quiz to find out if a career in engineering might be right for you!

PERSONALITY QUIZ:

- 1. Are you good at communicating with others?
- 2. Do you enjoy working in a team?
- 3. Do you get a sense of satisfaction when you solve a difficult homework problem?
- 4. Do you like math, physics or other science classes?
- 5. Are you curious about how things work or how things are built?
- 6. Do you hope to one day have a high-paying and flexible career?
- 7. Are you willing to work hard in your studies in order to be successful?
- 8. Would you describe yourself as determined, creative or good at solving problems?
- 9. Do you want to make a difference in your community or the world?
- 10. Would you like a degree that offers you many options?

If you answered "yes" to many of these questions, you may make a great engineer!

WHY WAIT?

If you are interested in engineering, there are a ton of ways to get a head start before college. Here are some helpful pointers:

Broad Education and Sports:

Since engineering is a broad field, it is important to obtain and foster positive teamwork and communication skills. Sports and clubs are a great way to improve discipline and teamwork skills, while also keeping you active and healthy.

The Arts:

To enhance your knowledge and creativity, try to explore the realms of performing and visual arts through museum visits, theatre performances, photography and everything in between.

Language, History, and Geography:

In addition to a second language, knowing the world around you is extremely important. Learning about the U.S. and other countries' governments, history, and cultures will be beneficial in almost any career, including engineering.

Get a Head Start:

Engineering relies greatly on mathematics and science. To help build a firm knowledge base of these two fields, try to take many math and science classes. These courses may not be easy, but they will help immensely when beginning your engineering journey. Courses include: algebra, geometry, trigonometry, and calculus, physics, chemistry, biology, ecology, and various other sciences, such as astronomy, economics, and psychology courses.





FAMOUS ENGINEERS

THOMAS EDISON

Patenting 1,093 inventions during his lifetime, Thomas Edison is one of the world's most influential and famous engineers of all time.

NEIL ARMSTRONG

Obtaining an aerospace engineering degree from Purdue University and a master's degree from University of South Carolina, Neil Armstrong went on to become the first man to set foot on the moon.



MONTEL WILLIAMS

After high school, Montel Williams enlisted in the Marine Corps. Williams later obtained a degree in engineering with a minor in international security affairs from the U.S. Naval Academy. He is now one of the most well-known television personalities in the United States.

JIMMY CARTER

Attending the Georgia Institute of Technology and the U.S. Naval Academy, Jimmy Carter focused on nuclear engineering. During his involvement in the Navy, Carter concentrated on submarines and later did graduate work in nuclear physics and reactor technology. In the Navy, he was also chosen for the nuclear submarine program. In 1977 Carter became the 39th President of the United States.

TOM LANDRY

Tom Landry graduated from the University of Houston with a master's degree in industrial engineering, and during World War II, Landry became a pilot. He then went on to become one of the NFL's most well-known coaches.

ALFRED HITCHCOCK

Before entering the film industry, world famous film director, Alfred Hitchcock, established a firm background in engineering. After graduating from the London County Council School of Engineering and Navigation, Hitchcock worked at the Henley Cable and Telegraph Company as a draftsman. During his time there, he discovered his calling, motion pictures.





Engineers Club of Philadelphia Founded in 1877 www.engrclub.org

On behalf of The Inquirer's NIE department and The Engineers' Club of Philadelphia, we would like to thank all of the sponsors for their support, dedication and efforts to expand knowledge and opportunity to our youth. If you are interested in learning more about the vast opportunities in the different fields of engineering, and would like to try some fun activities, check out our sponsors! Their websites are not only informative and educational, but loaded with fun facts, interesting and creative activities, and various scholarship opportunities.



Philadelphia **Engineering Foundation** Promoting Engineering's Future www.engrclub.org/to/PEF



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Pennsylvania Society of **Professional Engineers** Philadelphia Chapter www.pspe-philly.org

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