CONSIDERING AN ENGINEERING DEGREE? ADVICE FOR VETERANS

Many veterans turn their attention to higher education after their time in the military. The education and training received in the military can provide practical knowledge and skills that can provide a solid foundation for succeeding in college. For instance, mechanical or electrical training can be a great springboard to an engineering or technical degree, while logistics and human resource training can lead to a business or management degree. The discipline and time management skills honed in the military are a tremendous asset to future studies. Many universities recognize the assets that veterans bring and are excited to have veterans join their engineering programs. Based on research about student veterans in engineering, funded by the National Science Foundation (NSF), the goal of this report is to help veterans plan for college, especially for those who are interested in a bachelor's degree in engineering.

> "I think the thing that the military influenced the most in my decision [to pursue] engineering … was my job, and what I did. [The military] exposed me to mechanical systems … I worked on … shipboard fire-fighting systems … and I was good at it, and not only was I good at it, but I enjoyed that aspect."
> – Navy, Mechanical Engineering

Planning for an engineering degree while in the military

» If math wasn't a strong suit in high school, that doesn't mean a student veteran can't become an engineer now. Consider brushing up on math skills through free resources like Khan Academy at www.khanacademy.org. Student veterans bring a strong work ethic and sense of accountability, which are valuable skills, to their studies. As one student shared, "The military solidified the work ethic that I grew up with and I feel that determination is required to make it through any class, but particularly in engineering due to the complexities." – Air Force, Mechanical Engineering

» Many students enter college with strong skills in programs like Microsoft Excel, Word and PowerPoint. Goodwill Community Foundation, Inc. (GCF) offers free online resources that can be helpful in learning these programs. Visit https://edu.gcfglobal.org/en/excel2016/

- Those with strong skills in a specific area may want to register for College Level Examination Program (CLEP) exams which can provide course credit at many institutions in many common introductory courses, such as English composition, world languages, history, economics, etc. Active duty and student veterans may be eligible to take these exams at no cost. Visit https://clep.collegeboard.org/earn-college-credit/military-benefits
- If time allows, consider taking technical courses while serving in the military. This will help refresh practical skills and assist with the transition from the military to college, which can be abrupt to some people. As one student veteran in engineering described, "it gives you that …advantage because I know why it's important, I know why this is needed…" Additionally, certification programs (such as Six Sigma or Lean) have proven invaluable for some student veterans majoring in engineering.
- Consider taking math courses at a community college and transferring the credits to a four-year institution. Courses at community colleges are typically less expensive. Student veterans should start at whatever level of math that feels most comfortable and progress from there. It is best to have taken some calculus before going to a four-year university to pursue an engineering degree since calculus is required for engineering. As one student veteran shared, "For three years in the military, in my free time, I was taking classes that the military paid for…and it opened a lot of doors for me." – Marine, First-year Engineering
- Create a list of the technical skills gained during military service, such as working with equipment, testing systems, and software. Consider how military duties link or translate to a variety of engineering career pathways. There are many different kinds of engineering. Explore websites to learn more about them and how they might fit with various interests and skills:
  - My Next Move for Veterans, www.mynextmove.org/vets
  - TryEngineering, www.tryengineering.org
  - Engineering GoForIt! (eGFI), www.egfi-k12.org
  - O*NET OnLine, www.onetonline.org
- Celebrate the skills and assets gained while in the military, including experience with teamwork, leadership, problem-solving, and making presentations. All of these and more will be valuable assets toward a degree and career in engineering. As one student veteran shared, "You walk out of [the university] with a confidence in your ability to solve any problem that's put in front of you. There's a satisfaction that you get from problem-solving [that you learn in engineering]." – Navy, Mechanical Engineering

Paying for an engineering degree

- Post-9/11 GI Bill benefits can be used to pay for an engineering degree. They typically cover in-state tuition costs. These benefits, earned through sacrifice and service, have real monetary value and should be spent wisely. They are time limited — generally to 36 calendar months of full-time study (about eight to nine semesters). Therefore plan carefully how, when and where to spend these benefits.
- For engineering degrees, the Forever GI Bill STEM Extension might provide additional benefits. More information is at https://militarybenefits.info/gi-bill-stem-extension/
- Private colleges and universities may be affordable through the Yellow Ribbon Program. Learn more about this at https://www.military.com/education/gi-bill/the-yellow-ribbon-program-explained.html
- Fill out the Free Application for Federal Student Aid (FAFSA) to determine eligibility for financial aid beyond what is provided by the GI Bill. For example, some veterans may be eligible for Federal Pell Grant funds or other assistance such as state programs specifically for veterans.

Making the most of majoring in engineering at a four-year institution

- Use all available resources (professors, office hours, classmates, study groups, counseling, etc.) to help complete the mission of earning a bachelor's degree in engineering. Office hours are times when professors are in their offices to answer student questions. This is a great, and often underutilized, resource for help with classwork as well as to learn more about the profession.
  Go early in the semester to meet the professors and learn more about their career paths and research interests. This interaction establishes a relationship. When coming back to ask questions about classwork or a recommendation for a job, it feels more comfortable.
- Visit the veterans center on campus. Many student veterans find it helpful to meet other student veterans.
- Learn about the university's accommodations office. This office will provide resources for those who need assistance with learning or physical challenges. This office provides accommodations, such as extra time on tests or note-taking services, as well as counseling and tips for studying that can really help students be successful in college.
- Take advantage of the academic resources available to engineering majors, including tutoring and study groups for some of the more challenging engineering, math and science courses.
- Student veterans are encouraged to inform their professors of their veteran status. Maybe the professor is a veteran as well or opportunities that aren't offered to other students may be available. Professors may also show understanding to non-traditional students, including student veterans, like accommodating work/family schedules or needs related to physical challenges.
- Visit the career center on campus within the first year. Meet with a counselor to help translate military experiences to a résumé for a civilian audience. Ask about opportunities for work experiences.
- Many engineering programs emphasize internships and co-op work experiences. These are excellent pathways for gaining professional experience in the chosen field of study and for gaining a "competitive edge" upon graduation. Some companies have specific programs for veterans. Most engineering internships are paid.

"Know yourself and seek self-improvement" [is one way the military influenced me.] I'm continuously challenged through the engineering program. Last year I thought my classes were hard, and I got used to it. And I had to take a step back and 'set the example,' I'd rather be the student who over-does everything and gets a better grade than the student who does too little and just doesn't care."
– Marine, First-year Engineering

- Find a support system such as other veterans, classmates or a spouse. Consider offering mentorship and guidance to a newly admitted student veteran on campus.
- Be patient with traditional classmates, many of whom have not had the same real-world experiences as most student veterans. Choose to be a positive role model to these students.
- Keep up on all required paperwork for the Department of Veteran Affairs (VA) and education benefits. Develop a good working relationship with the campus student veteran representative including the School Certifying Official (SCO). Navigating the process of using the GI Bill can be challenging and these folks can help.
- Everyone who has served in the military is a "real veteran," even if they didn't serve in a combat role, weren't deployed, or weren't injured during their service.

About the project

The NSF-sponsored project "Military Veteran Students' Pathways in Engineering Education" brings together an interdisciplinary research team from engineering, sociology, and education with expertise on veterans, gender, race/ethnicity, social capital, and persistence in higher education providing a strong foundation for advancing knowledge in engineering education. The project addresses gaps in the literature on student veterans in engineering by exploring their pathways and experiences across four institutions. During the four-year study, dozens of student veterans in engineering were interviewed individually and in focus groups to study the conditions under which student veterans pursue engineering education and the factors that support their success. The goal was to understand what made them successful as they transitioned from the military to pursuing a bachelor's degree in engineering and understand how the military and universities can best support the success of student veterans. University administrators and veteran support personnel were also interviewed to learn about policies and practices that shape successful student veteran experiences. The results of this project can help student veterans thrive in college and specifically in engineering majors and inform strategies for faculty and administrators in serving student veterans.

The project team consists of:
- Susan M. Lord, Integrated Engineering, University of San Diego
- Catherine E. Brawner, Research Triangle Educational Consultants
- Michelle M. Camacho, Sociology, University of San Diego
- Joyce B. Main, Engineering Education, Purdue University
- Catherine Mobley, Sociology, Clemson University

CLEMSON UNIVERSITY

PURDUE UNIVERSITY | School of Engineering Education

NC STATE UNIVERSITY

University of San Diego

Supported by NSF "Military Veteran Students' Pathways in Engineering Education" Grants EEC-1428512 and 1428646

The recommendations expressed are those of the authors and do not necessarily reflect the views of the National Science Foundation.