SURVEYING ENGINEERING, B.S.

Begin Campus: Wilkes-Barre

End Campus: Wilkes-Barre

Program Description

The Surveying Engineering major provides a basic undergraduate education required for private and public service in the profession of surveying. Particular emphasis is placed on fundamental surveying principles required in all areas of surveying. Instruction is provided in the main divisions of surveying, including land surveying, boundary mapping, photogrammetry, laser scanning, data analysis and adjustment, geodesy and map projection coordinate systems, remote sensing, geographic information systems, and land development. Students study various data collection techniques using surveying tools including total stations, photogrammetry, laser scanners, unmanned aerial systems (UASs), remote sensing satellite imagery, and the global navigation satellite system (GNSS). They also study legal principles related to land surveying, professional ethics, applications for Geographic Information Systems (GIS) in surveying, and data management techniques, and point cloud processing methods for 3D modeling and surveying product delivery.

What is Surveying Engineering?

Surveying is the science of measuring physical features of Earth to collect spatial information and to establish land boundaries. Surveying engineers learn the elements of surveying as applied to construction, land, topographic, geodetic, city, and photogrammetric surveys.

You Might Like This Program If...

- You enjoy the outdoors.
- You have an interest in math and science.
- You are passionate about robotic, GPS, scanner, GIS, and drone technology.
- You are interested in geographic data and how it is captured, stored, manipulated, analyzed, and managed.

Direct Admission to the Major

Incoming first-year students who meet the program admission requirements are admitted directly into the major. Admission restrictions may apply for change-of-major and/or change-of-campus students.

For more information about the admission process for this major, please send a request to the college, campus, or program contact (listed in the Contact tab).

Degree Requirements

For the Bachelor of Science degree in Surveying Engineering, a minimum of 127-128 credits is required:

Requirement	Credits
General Education	45
Electives	0-1
Requirements for the Major	108-110

27 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/).

Code	Title	Credits
Prescribed Courses		
EDSGN 100	Cornerstone Engineering Design	3
MATH 230	Calculus and Vector Analysis	4
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
PHYS 214	General Physics: Wave Motion and Quantum Physics	2
SUR 132	Surveying Software Analysis Tools	3
SUR 213	Route and Construction Surveying	3
SUR 222	Photogrammetry	3
SUR 341	Adjustment Computations	3
SUR 352	Geometric and Physical Geodesy	3
SUR 361	Surveying Laser Scanning	3
SUR 381	Stormwater Hydraulics and Hydrology	4
SUR 421	Advanced Photogrammetry	3
SUR 441	Data Analysis and Project Design	3
SUR 455	Precise Positioning Systems	3
SUR 471	Professional Aspects of Land Surveying	3
Prescribed Courses: Require a grade of C or better		
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MATH 220	Matrices	2-3
SUR 121	Elementary Surveying	3
SUR 122	Control Surveying	3
SUR 221	Large-scale Mapping Surveys	3
SUR 241	Surveying Measurement Analysis	3
SUR 373W	Cadastral and Legal Aspects of Surveying	4
Additional Courses		
CE 410	Sustainable Residential Subdivision Design	3
or SUR 482	Land Development Design	
CMPSC 201	Programming for Engineers with C++	3
or CMPSC 200	Programming for Engineers with MATLAB	
STAT 401	Experimental Methods	3-4
or STAT 200	Elementary Statistics	
Select one of the following:		3
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
ECON 14	Principles of Economics	
Additional Courses: Require a grade of C or better		
CAS 100A	Effective Speech	3
or CAS 100B	Effective Speech	

ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	
ENGL 202C	Effective Writing: Technical Writing	3
or ENGL 202D	Effective Writing: Business Writing	
Supporting Courses and Related Areas		
Select 6 credits from the following:		6
CE 300-level courses [1]		
CE 400-level courses [1]		
IE 302	Engineering Economy	
SUR 313	Integrated Surveying	
SUR 362	Introduction to Geospatial Information Engineering	
SUR 424	Monitoring Applications in Surveying	
SUR 432	Geospatial Applications in Surveying	
SUR 496	Independent Studies	
SUR 497	Special Topics	

[1] These courses are not offered at Wilkes-Barre campus. They are provided to accommodate concurrent degree students in CE and SURE.

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN,** may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher**:** 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/)). For more information, check the Suggested Academic Plan for your intended program.

Program Educational Objectives

The Surveying Engineering program prepares students with technical and professional skills for professional practice. Within three to five years of graduation, our Surveying Engineering graduates will have:

1. Forged careers as surveyors, engineers, and/or managers within surveying, engineering, or related fields, whether in the private or public sector, actively contributing to business operations.
2. Demonstrated expertise in using mathematics, scientific principles, measurement techniques, and contemporary technology tools in surveying for proficiently collecting and analyzing spatial data, as well as for developing surveying and/or engineering design solutions for practical applications.
3. Exhibited a strong commitment to ethical and professional conduct, consistently adhering to industry standards and ethical principles across all aspects of their professional work.

4. Demonstrated proficiency in effectively articulating technical and non-technical concepts to diverse audiences through written, verbal, and graphical mediums.
5. Worked collaboratively within multidisciplinary teams, showcasing their ability to function as productive team members, lead projects, respect diverse perspectives, and contribute to team success.
6. Engaged in continuous professional development, including pursuing advanced degrees, pursuing professional certification(s) and/or licensure, or participating in professional organizations, to stay current in the field, enhance their knowledge and skills, and share that with the professional community.

Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation. The Surveying Engineering program is designed to enable students to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. Communicate effectively with a range of audiences
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/32-00-advising-policy/)

Wilkes-Barre

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2024-25 academic year. To access previous years' suggested academic plans, please visit the archive (https://bulletins.psu.edu/undergraduate/archive/) to view the appropriate Undergraduate Bulletin edition.

Surveying Engineering, B.S. at Wilkes-Barre Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer here:

https://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx

First Year

Fall	Credits	Spring	Credits
ENGL 15 (GWS)[‡†]	3	ECON 102 or 104 (GS)[†]	3
EDSGN 100	3	MATH 141 (GQ)[*‡†]	4
PSU 8	1	PHYS 211 (GN)[†]	4
MATH 140 (GQ)[*‡†]	4	STAT 200	4
General Education Course	3	General Education Course	3
General Education Course	3		
	17		**18**

Second Year

Fall	Credits	Spring	Credits
MATH 230	4	MATH 251	4
PHYS 212 (GN)[†]	4	PHYS 214 (GN)	2
CMPSC 201 or 200	3	ENGL 202C or 202D (GWS)[‡†]	3
SUR 121[*]	3	SUR 122[*]	3
		SUR 132	3
		MATH 220[*]	2
	14		**17**

Third Year

Fall	Credits	Spring	Credits
SUR 221[*]	3	SUR 222	3
SUR 213	3	SUR 373W[*]	4
SUR 241[*]	3	SUR 341	3
SUR 361	3	SUR 352	3
CAS 100A or 100B (GWS)[‡†]	3	SUR 381	4
General Education Course (GHW)	1.5		
	16.5		**17**

Fourth Year

Fall	Credits	Spring	Credits
SUR 441	3	SUR 471	3

SUR 455	3	SUR 482	3
SUR 421	3	SUR 432 or 313 (Technical Elective)	3
SUR 362, 424, or IE 302 (Technical Elective)	3	General Education Course	3
General Education Course (GHW)	1.5	General Education Course	3
	13.5		**15**

Total Credits 128

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Career Paths

Graduates from the surveying engineering program work at government agencies and private industry companies and specialize in boundary surveying, geodesy, image analysis (photogrammetry and remote sensing), and geographic information systems.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE SURVEYING ENGINEERING PROGRAM (https://career.engr.psu.edu/)

Professional Resources

- National Society of Professional Engineers (https://nsps.us.com)
- American Society of Civil Engineers (https://www.asce.org)

Accreditation

The Bachelor of Science in Surveying Engineering at Penn State Wilkes-Barre is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Surveying and Similarly Named Engineering Programs.

Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (https://opair.psu.edu/plc/dashboard/) interactive map.

Contact

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