

Welding Engineering

Welding engineering employs science and engineering in joining components made of metals, ceramics, plastics, and other materials. Welding engineering includes the designing of the joints to be welded, the development of the detailed joining procedures to be used, the selection of the materials incorporated in the joint, joint inspection, and the quality control for the final product. Welding engineering can also involve research in these areas, such as developing new welding processes or procedures for new materials. Welding engineers work with design engineers to develop efficient welding designs and fabrication procedures.

Pursuing Welding Engineering at Ohio State

High school students should have strong high school preparation in science and mathematics. Computer and communication skills are also very important.

Students who come to Ohio State to study engineering that have a minimum ACT Math score of 24 or SAT Math score of 560 will be directly enrolled as pre-engineering students in the College of Engineering. Those students not eligible to directly enroll in engineering may enroll in the Science and Technology Exploration Program that is part of our Exploration Program described further at exploration.osu.edu.

Upon admission to the College, students can apply directly to the welding engineering program and begin work in the pre-major courses, which include: calculus and analytic geometry, inorganic chemistry, physics, and engineering graphics. In order to progress from the pre-major into the welding engineering major, the student must attain a minimum cumulative point-hour ratio (CPHR) of 2.0 in the above pre-welding engineering courses, as well as a minimum 2.0 overall CPHR.

Program Educational Objectives

- Welding engineers will be able to utilize the fundamental principles of engineering science and mathematics, and are aware of the underlying historic, social, ethical and aesthetic aspects of engineering.
- Welding engineers will have knowledge of the fundamental theory of the process, design, materials and testing aspects of welding.
- Welding engineers will be able to apply their fundamental welding engineering knowledge in an integrated fashion to solve diverse practical problems in the welding and joining field.
- Welding engineers will be able to communicate effectively in written, oral, and informal forms with a variety of audiences.

- Welding engineers will be able to work effectively in independent and collaborative aspects of their professional activity in an organized and productive fashion.

Co-Curricular Opportunities

A strong American Welding Society (AWS) Student Chapter also helps provide students with further educational activities. AWS members help with the annual Open House recruiting event, as well as other recruiting activities and provide other services to the department and the program, including operating the bookstore for specialized educational and promotional materials. Professional speakers are invited to AWS student chapter meetings and plant and industry tours are sponsored. In addition, the student chapter often combines meetings with the local professional AWS Chapter for an exposure to an even broader range of professional speakers and topics.

Welding engineering students are required to complete a one-quarter internship before graduation, generally in the summer before the final year. Students are encouraged to plan for other co-op or internship opportunities earlier in their academic career. Co-op and/or internship experience not only helps a student earn high wages toward their academic expenses, but also to use the knowledge gained to decide what area, if any, in which they may wish to concentrate their technical electives, and/or whether graduate work would be appropriate. A student often receives a job offer upon graduation from a company with which they co-oped or interned.

Welding engineering students often find time to also take a minor in addition to their major course work. A minor helps a student explore the basics in another area of study which will be ultimately helpful in their careers. Students take minors in nuclear engineering, manufacturing engineering, biomedical engineering, business, languages, and many other areas available at Ohio State.

Honors & Scholars Programs

The Welding Engineering program has an active Honors Program. The department Faculty Honors Advisor sponsors one or two social events a year for our honors students and presents a workshop to help students prepare for the Senior Honors Research competition.

Many welding engineering Honors students successfully compete for scholarships in the annual College of Engineering Senior Research competition, which allows an Honors student to explore a topic in more depth one-on-one with a faculty member. This exploration often helps a student make a more informed decision about graduate studies, as well as bringing recognition at the

For more information, check these web sites:

Welding Engineering: www-iwse.eng.ohio-state.edu

College of Engineering: www.engineering.osu.edu

Ohio State: www.osu.edu

Admissions: www.undergrad.osu.edu

Multicultural Center: www.multiculturalcenter.osu.edu

First Year Experience Program: www.fye.osu.edu

Curriculum Sample

This is a sample list of classes a student will take to pursue welding engineering. Since university students need more than specific education in a narrow field, they also will take classes to complete the General Education Curriculum (GEC). The GEC will allow students to develop the fundamental skills essential to collegiate success across major programs. Course work options satisfying the GEC often come from a variety of academic areas of study allowing students to tailor their GEC toward their interests. Note: This sample represents one of several possible paths to a degree in Welding Engineering. Consult the departmental web site, www-iwse.eng.ohio-state.edu/isestaff/hussen/Web/pamhome.html, for details.

Freshman Year:

Engineering Survey	1
Calculus and Analytic Geometry	15
Chemistry	9
Introduction to Engineering	6
Physics	10
Programming	4
GEC (English composition)	5
Total hours	50

Sophomore Year:

Calculus and Analytic Geometry	5
Differential Equations	4
Physics	5
Electrical Circuits & Lab	4
Manufacturing Engineering	3
Statics	4
Strength of Materials	4
Survey of Welding Engineering and Labs	5
Introduction to Materials Science	3
GEC (social sciences)	10
Total hours	47

Junior Year:

Materials Thermodynamics	4
Phase Diagrams	3
Materials Science Lab	2
Structural Transformations	3
Physical Principles in Welding Engineering I, II and Lab	7
Analysis for Design and Simulation	4
Welding Engineering Design	4
Welding Applications	3
Introduction to Welding Metallurgy	3
Welding Processes Lab	1
GEC (second writing course)	5
GEC (literature)	5
GEC (arts and humanities)	5
Total hours	49

Senior Year:

Welding Metallurgy I, II, and Lab	7
Nondestructive Evaluation and Lab	4
Industrial Experience	1
Non-Ferrous & High Allow Weld Analysis	1
Industrial Quality Control	4
Welding Design I, II, and III	5
Engineering Economic Analysis	3
Technical Electives	17
GEC courses (history)	10
Total hours	52

University-wide Denman Research Forum presentations of undergraduate student research.

Honors students may choose to use the Senior Petition, which allows a student to receive graduate credit for up to 15 credit hours of work taken while a Senior which is not required as part of their undergraduate program. In addition, many welding engineering Honors students each year are admitted to the Combined B.S./M.S. Degree program, which allows a student with at least a 3.5 cumulative grade point average to be admitted to graduate school during their senior year and to count up to 15 hours of course work toward both their graduate and their undergraduate degrees, which then shortens the time-to-degree for the Masters. Combined degree scholarships for our students are often supported through our partnerships with public and private institutions interested in the advancement of welding engineering-related knowledge.

Career Prospects in Welding Engineering

Welding engineers are involved in research and development, production, construction, and inspection functions involving welded fabrication. They also work in consulting, teaching, management, sales, and service functions. There are also opportunities to be owners or partners in private sector businesses.

As the world becomes more conscious of the environment and the need for conservation of natural resources, many new opportunities are available for welding engineers. These opportunities include the design and manufacture of lighter and safer automobiles, trucks, and airplanes with increased fuel economy and improved environment control systems. The exploration of space brings the opportunity of designing and manufacturing space probes and space shuttles. Welding engineering is a growing profession, and it is expected to continue in this growth for many years. Beginning salaries for welding engineers range from \$45,000 to \$53,000, with an average in the high 40s, depending on individual qualifications.

More About Welding Engineering

The Ohio State University Department of Industrial Welding and Systems Engineering offers students a unique opportunity in that it is the only accredited welding engineering program in the United States offering bachelor's, master's, and doctorate degrees in welding engineering. Because of this uniqueness, the Department of Welding Engineering has been recognized throughout the industry as a leader in welding education and research. Graduates of this department are highly recruited for their diverse educational background. The professors of this department have worldwide reputations as leaders in their respective areas for their vast experience and research. One of the advantages of the welding engineering program is that it is relatively small, allowing greater student-professor interaction.

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Contact information:

Ohio State's welding engineering program is accredited by the Engineering Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, (410) 347-7700.

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