Bachelor of Science in Systems Science & Engineering

This professional degree program is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org).

Key points:

- Systems Engineering: how to integrate different components in engineering systems
- Operations Research: mathematical solutions to business problems
- Pre-Financial Engineering: the best preparation for the MS in Financial Engineering
- Applied Mathematics
- Control Engineering: how to control jet airplanes, electric power grids, and the nation’s economy
- Ideal for students strong in math and physics
- Ideal for students interested in engineering and business
- Ideal for students interested in a second degree
- The most mathematical program in the McKelvey School of Engineering
- The most flexible professional program in the McKelvey School of Engineering

The Bachelor of Science in Systems Science & Engineering (BSSSE) program educates students in the engineering and science of systems. Graduates are expected to have mathematical competence and knowledge of systems analysis, control, design methods, numerical methods, differential equations, dynamic systems theory, automatic control theory, system stability, estimation, optimization, modeling, identification, simulation and basic computer programming. Graduates will have an engineering outlook and engineer’s competence of their own and be able to interact fully with other engineers. They will also possess sufficient proficiency in computer use to design algorithms for simulation, estimation, control and optimization.

The engineering departments of high-technology industries are staffed by large numbers of engineers with this type of expertise. However, graduates are by no means restricted to careers in traditional industry or in high-technology industries. Within the outlined framework, a salient feature of the program is its flexibility and interdisciplinary nature. It is possible for students to orient their study toward preparation for systems science and engineering work in large, complex systems, such as transportation and power; communications networks; societal systems like the economy, ecology and cities; and biological systems. Students may wish to prepare for work along theoretical or professional lines. There is ample room in the program structure to accommodate all of these interests and to make preparation at the BS level ideally suited for a student’s future plans and interests.

Educational Objectives of the Bachelor of Science in Systems Science & Engineering (BSSSE) Degree Program

A. Our graduates will be engaged as practicing professionals in a broad range of careers in industry and government, or they will pursue advanced degrees in academic graduate education in engineering or a related field.

B. Our graduates will function effectively as members of teams demonstrating sensitivity to professional and societal contexts, integrity and versatility.

Student Outcomes

Graduates of the BSSSE program are expected to know or have the following:

a. An ability to apply knowledge of mathematics, science and engineering
b. An ability to design and conduct experiments as well as to analyze and interpret data
c. An ability to design a system, component or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
de. An ability to function on multidisciplinary teams
e. An ability to identify, formulate and solve engineering problems
f. An understanding of professional and ethical responsibility
g. An ability to communicate effectively
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
i. A recognition of the need for and an ability to engage in lifelong learning
j. A knowledge of contemporary issues
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

BSSSE Degree Requirements

The course sequence designed to achieve the type of education outlined above requires at least 120 units, satisfies the residency and other applicable requirements of Washington University and the McKelvey School of Engineering, and meets the following program requirements:

1. Common Studies program of the McKelvey School of Engineering: This includes courses in engineering, mathematics, physics, chemistry, humanities, social
7. 12 units in engineering concentration outside of systems science and engineering are required. These units must all be taken in one of the following engineering areas:

- Biomedical Engineering
- Chemical Engineering
- Computer Science & Engineering
- Electrical Engineering

ESE courses. The use of basic required courses to fulfill the requirement for an outside concentration is not permitted.

8. The entire course sequence for the BSSSE, containing engineering topics of at least 45 units, must be completed.

The number of engineering topics units assigned to undergraduate courses in the McKelvey School of Engineering vary from none (0) to the number of credits given to the course. For the precise number for each course, please refer to the table of Topics Units — Engineering Courses (http://engineering.wustl.edu/current-students/student-services/Pages/default.aspx) provided by Engineering Undergraduate Student Services.

9. Limitations: No more than 6 units of the combined units of ESE 400 Independent Study and ESE 497 Undergraduate Research (including 497A and 497B) may be applied toward the SSE elective requirement (item 6) of the BSSSE degree.

Any remaining combined units are allowed as free electives to satisfy the requirement for the total number of units.

10. The courses taken to satisfy the following BSSSE degree requirements must be taken for a letter grade and not on a pass/fail basis: item 3 (required ESE courses), item 5 (elective laboratory course) and item 6 (elective ESE courses).