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## Human Factors Engineering

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# Human Factors Engineering

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College of Engineering and Computer Science  
Wright State University

## What is Human Factors Engineering?

Human factors engineering is a specialized field that has developed in response to a particular need within the engineering community. That need is to design machines in such a way that their human operators will make fewer mistakes or have fewer accidents, and the machines operated or directed by humans will perform better. The human factors engineer participates in engineering design projects so that the resulting machines are compatible with the characteristics of the human operator.

The capability for intelligent design of machines for human use depends upon the integration of knowledge about machines with knowledge about the characteristics of humans. The knowledge and techniques of machine design have been developed by engineers; the knowledge and techniques of understanding human behavior have been developed by psychologists. In the past, these dual inputs were frequently provided by including psychologists in groups with design engineers. This approach met with limited success, and there has been a growing realization that there needs to be people in each group who can speak the language of both the psychologist and the engineer.

Graduates of the human factors engineering program at Wright State are engineers. They take all of the basic courses of the Wright State program in systems engineering, including the physics and calculus sequences. They also have the equivalent of an undergraduate major in experimental psychology, including sensation and perception, and statistical methods. Graduates of the program are qualified for graduate work in either engineering or psychology.

While there are very few undergraduate programs in human factors engineering in the United States, there are a number of graduate programs. Many different opportunities exist for graduates of the Wright State program to enter other university programs leading to the master's and doctoral degrees.

## Career Opportunities

All major manufacturers of aircraft, automobiles, and electronic systems now employ human factors engineers to research and participate in the design of their products. In addition, there are government laboratories in the Departments of Defense and Transportation, NASA, the Postal Service, and other agencies that employ a sizable number of human factors engineers in research and development activities. The need for human factors engineers is being recognized steadily in a variety of other industries and organizations.

In addition to providing personnel qualified to work in specialized research and development activities, there is a growing realization of the need for human factors engineers to be a part of nearly every engineering design group. Graduates of the Wright State program will be employable as engineers. Their systems engineering background will provide them with the knowledge required to work in a broad range of engineering jobs. Their ability to understand the psychological literature and the human limitations in design and operations will provide an extra dimension to their capability as design engineers. It is anticipated that they can be valuable members of nearly every engineering design group.

Human factors engineers today are channeling significant input into a variety of research, manufacturing, and management fields. Perhaps one of the most significant fields in which the study of human relation to machines is having a visible impact is that of highway safety research. Efforts have brought improved highway signing and marking, more effective driver education, and safer, more efficient automobiles. The work of human factors engineers in the aviation and space programs has received more publicity than other applications of their skills, but to the ordinary citizen other contributions of the field are equally important.

Besides providing the background for the design of consumer products, the human factors background can lead into research activities in a variety of interesting and important areas, such as biomedical engineering, effects of environmental stress on human performance, pattern recognition (used to build machines to read handwritten language, etc.), computer programs for language translations, and decision theory.

### High School Preparation

Strong high school preparation in mathematics and science is essential for human factors engineering majors. The recommended program includes geometry, trigonometry, and two years of algebra. In addition, physics, chemistry, and biology would provide a useful background.

It is expected that students of the high school graduating *class of 1987* and thereafter will have completed the following courses before attending Wright State. Students not meeting these requirements will need to make up deficiencies prior to their graduation from Wright State. A *unit* is one academic year of course work.

Four units of English

Three units of mathematics (including Algebra I and II)

Three units of social science (including two units of history)

Three units of science

Two units of a foreign language (the same foreign or classical language through level II)

One unit of visual or performing arts

### The Degree Program

The undergraduate program leads to a Bachelor of Science degree in human factors engineering. Both a standard four-year degree program and a five-year cooperative education program are available. Upon completion of the degree, students can pursue careers as engineers or continue their education at the graduate level in either psychology or engineering.

Because a well-rounded liberal education is a primary concern at Wright State, human factors engineering majors must take two courses in English composition and ten courses in the humanities, arts, and social sciences.

The systems engineering portion of the program consists of courses in calculus, physics, statics, dynamics, linear systems, control systems, computer programming, applied statistics, and design of experiments. The psychology core consists of sensation and perception, experimental methods, and industrial and experimental psychology. Seminars, student projects, and courses by faculty versed in the practical and theoretical aspects of the field tie the separate areas together.

### For Further Information

If you want to know more about the degree program in human factors engineering contact the Office of Admissions, Wright State University, Dayton, Ohio 45435, 513/873-2211. You will be able to arrange for a campus tour or talk with an admissions counselor about applying for admission or financial aid.

### Sample Four-Year Curriculum Bachelor of Science in Human Factors Engineering

Freshman Year		Sophomore Year		Junior Year		Senior Year	
<i>First Quarter</i>	<i>16</i>	<i>Fourth Quarter</i>	<i>18</i>	<i>Seventh Quarter</i>	<i>18</i>	<i>Tenth Quarter</i>	<i>18</i>
Computer Programming I	4	Calculus IV	5	Chemistry I	5	Applied Electronics	5
Calculus I	5	General Physics I	5	Circuit Analysis	5	Thermodynamics	4
Introductory Psychology I	4	Statics	4	Test and Measurement	4	Technical Elective	3
Fine and Performing Arts	3	Engineering Psychology	4	History Ancient	3	Technical Elective	3
<i>Second Quarter</i>	<i>17</i>	<i>Fifth Quarter</i>	<i>18</i>	<i>Eighth Quarter</i>	<i>16</i>	Comparative Studies	3
Computer Programming II	4	Differential Equations	5	Chemistry II	5	<i>Eleventh Quarter</i>	<i>17</i>
Calculus II	5	General Physics II	5	Linear Systems I	4	Control Systems I	4
Introductory Psychology II	4	Engineering Computer Analysis	4	Technical Elective	4	Human Factors Engineering Design	4
Freshman Composition	4	Applied Statistics II	4	History Transition	3	Biomedical Engineering Systems I	3
<i>Third Quarter</i>	<i>16</i>	<i>Sixth Quarter</i>	<i>16</i>	<i>Ninth Quarter</i>	<i>16</i>	Great Books	3
Calculus III	5	Dynamics	4	Linear Systems II	3	Economic Life	3
Applied Statistics I	4	General Physics III	5	Cognition and Learning	4	<i>Twelfth Quarter</i>	<i>17.5</i>
Social Life	3	Political Life	3	History Modern	3	Control Systems II	4
Freshman Composition	4	Perception	4	Regional Studies	3	Systems Approach to Human Factors	4
				Technical Elective	3	Engineering Drawing	2.5
						Technical Elective	3
						Industrial Psychology	4

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Dayton, Ohio 45435