

Department of Physics & Engineering Physics

PRE-ENGINEERING PROGRAM

(Two-year non-degree program)

Engineering is a profession that uses basic knowledge from the mathematical and natural sciences and utilizes the materials and forces of nature to develop systems that will perform optimally and economically for the benefit of mankind. Nowhere is this more evident than in the latter part of the twentieth century where such technological advancements as nuclear power, the electronic digital computer, microelectronics, and interplanetary space navigation have made profound changes in our way of life. The engineer has been a principal developer of this technology.

Pre-engineering is a two-year non-degree program offered by the Department of Physics & Engineering Physics. Students will transfer to another university for an additional two years of study from which they will receive their engineering degree. The engineering curriculum is closely articulated with programs at the Missouri University of Science & Technology (formerly University of Missouri-Rolla). Rolla's General Engineering Transfer Guide is attached and can also be viewed on-line at:

http://admissions.mst.edu/transfer/model_programs/semsu_majors.html (UMR)

For programs at the University of Missouri (formerly University of Missouri-Columbia), students must first refer to the on-line undergraduate catalog for the curriculum of a particular program and then read the course descriptions to find the equivalent courses at Southeast Missouri State University.

<http://registrar.missouri.edu/degrees-catalogs/2008-2010/0810-catalog-engineering.pdf> (UMC)

Students should expect to complete from 64 to 68 credit hours of course work prior to transferring. Several transfer scholarships are available each year to students who maintain a high academic standing. Fields of study include aerospace engineering, agricultural engineering, ceramic engineering, chemical engineering, civil engineering, computer engineering, electrical engineering, engineering management, geological engineering, industrial engineering, mechanical engineering, metallurgical engineering, mining engineering, nuclear engineering, and petroleum engineering.

FACULTY ADVISORS:

Dr. John Tansil
Dr. David Probst
Dr. Jai Dahiya

CAREER OPPORTUNITIES:

Research Engineer, Development Engineer, Design Engineer, Production Engineer, Construction Engineer, Plant Engineer, Operations Engineer, Environmental Engineer, Instrumentation Engineer, Systems Engineer, Product Engineer, Engineering Manager.

EMPLOYMENT OUTLOOK:

The wide variety of job opportunities and the attractive salaries that the profession commands combine to make engineering a worthwhile career. Engineering applications range from the microscopic world of integrated circuits to mammoth construction projects such as bridges and dams. Job opportunities are available in private industry and with state and federal government agencies in such areas as applied research, development, design, production and construction, operations, sales, and management.

HIGH SCHOOL PREPARATION FOR MAJOR:

Students should have completed four years of mathematics, which includes trigonometry and an introduction to calculus. Four years of science, which includes chemistry and physics, is highly recommended. A strong background in English and a speech course are desirable since an engineer's job requires effective written and verbal communication.

TWO-YEAR PRE-ENGINEERING PROGRAM

The following generic pre-engineering program is a very general guide. It should only be used by students who are not sure which field of engineering they are going to pursue or to which university they are going to transfer.

If students know which university they are transferring to, they should

- **EITHER go to that university's web site for specific information about their program (see the web addresses listed previously)**
- **OR obtain an undergraduate bulletin from that university for specific information about their program.**

<u>First Semester</u>	<u>Hrs</u>	<u>Second Semester</u>	<u>Hrs</u>
CH185 General Chem. I Lecture	5	MA145 Analytic Geom. & Calc. II	4
CH085 General Chem. I Laboratory	+	PH230 General Physics I Lecture	5
CH005 General Chem. I Recitation	+	PH030 General Physics I Laboratory	+
MA140 Analytic Geom. & Calc. I	5	CS155 Computer Science I	4
EP100 Physics & Engr. Concepts	1	MN120 Fund. of Engr. Design Process	3
EN100 English Composition	3		
CS177 Programming for Sci. & Engr.	<u>3</u>		—
	17		16

<u>Third Semester</u>	<u>Hrs</u>	<u>Fourth Semester</u>	<u>Hrs</u>
MA240 Analytic Geom. & Calc. III	3	MA245 Vector Calculus	2
PH231 General Physics II Lecture	5	MA350 Differential Equations I	3
PH031 General Physics II Laboratory	+	EP240 Circuit Analysis	4
EP261 Engr. Mechanics: Statics	3	EP262 Engr. Mechanics: Dynamics	3
EC215 Principles of Microeconomics	3	Humanities/Soc. Sci. Elective	3
PS103 U.S. Political Systems	<u>3</u>		—
	17		15

NOTE: Students who enter the pre-engineering program with a mathematics deficiency must first take MA135 Algebra & Trigonometry (or both MA133 Plane Trigonometry and MA134 College Algebra) prior to taking MA140 Analytic Geometry & Calculus I. It is strongly recommended that MA135 be taken in the summer semester before starting the sequence of courses listed above.

A much less desirable alternative for mathematically deficient students would be to take MA135 (or both MA133 and MA134) in the fall semester and then to spend the following summer at another university taking both MA145 Analytic Geometry & Calculus II and PH230 General Physics I. The sequence of courses for this program is outlined on the following page as an Alternative Two-Year Pre-Engineering Program.

ALTERNATIVE TWO-YEAR PRE-ENGINEERING PROGRAM
(for students with a mathematics deficiency)

This program is for students who enter Southeast Missouri State University with a deficiency in mathematics and must schedule MA135 Algebra & Trigonometry prior to taking MA140 Analytic Geometry & Calculus I. The preferred way to do this is to take this course in the summer before starting the normal sequence of courses shown on the previous page.

The following pre-engineering program for mathematically-deficient students is a very general guide. It should only be used by students who are not sure which field of engineering they are going to pursue or to which university they are going to transfer.

If students know which university they are transferring to, they should

- **EITHER go to that university's web site for specific information about their program (see the web addresses listed previously)**
- **OR obtain an undergraduate bulletin from that university for specific information about their program.**

<u>First Semester</u>		<u>Hrs</u>	<u>Second Semester</u>		<u>Hrs</u>
CH185	General Chem. I Lecture	5	MA140	Analytic Geom. & Calc. I	5
CH085	General Chem. I Laboratory	+	PS103	U.S. Political Systems	3
CH005	General Chem. I Recitation	+	EC215	Principles of Microeconomics	3
EP100	Physics & Engr. Concepts	1	CS177	Programming for Sci. & Engr.	3
MA135	Algebra & Trigonometry	5	MN120	Fund. of Engr. Design Process	3
EN100	English Composition	<u>3</u>			<u>17</u>
		14			

Summer (at another university that offers both of these courses in the summer semester)

MA145	Analytic Geom. & Calc. II	4
PH230	General Physics I Lecture	5
PH030	General Physics I Laboratory	<u>±</u>
		9

<u>Third Semester</u>		<u>Hrs</u>	<u>Fourth Semester</u>		<u>Hrs</u>
MA240	Analytic Geom. & Calc. III	3	MA245	Vector Calculus	2
PH231	General Physics II Lecture	5	MA350	Differential Equations I	3
PH031	General Physics II Laboratory	+	EP240	Circuit Analysis	4
EP261	Engr. Mechanics: Statics	3	EP262	Engr. Mechanics: Dynamics	3
CS155	Computer Science I	<u>4</u>		Humanities/Soc.Sci. Elective	<u>3</u>
		15			15

Missouri S&T — Southeast Missouri State University

General Engineering Transfer Guide - Effective Fall 2008

The following Southeast Missouri State University course work will apply to Missouri S&T engineering degree requirements as outlined below.						
Southeast Missouri State University				Missouri S&T		
	SEMO#	Title	Hours	S&T #	Title	Hours
Engineering Degree Requirements: Take all Courses						
General Pre-Engineering Curriculum	Math prerequisites. While they are not part of Missouri S&T engineering degree requirements, algebra and trigonometry skills are critical to success in calculus. Students should follow math placement testing and advising recommendations at their schools.					
	MA 140	Analytical Geometry and Calculus I	5	MATH 014	Calculus for Engineers I	4
	MA 145	Analytical Geometry and Calculus II	5	MATH 015	Calculus for Engineers II	4
	MA 240 and MA 245****	Analytical Geometry and Calculus I and Vector Calculus****	3 2	MATH 022****	Calculus with Analytic Geometry III	4
	MA 350	Differential Equations I	3	MATH 204	Elementary Differential Equations	3
	PH 230	General Physics I	5	PHYS 023	Engineering Physics I	4
	PH 231	General Physics II	5	PHYS 024	Engineering Physics II	4
	CH 185	General Chemistry I and Lab	5	CHEM 001, 002	General Chemistry (1st semester) and Lab	5
	EP 100	Physics and Engineering Concepts	1	FE 010	Study and Careers in Engineering	1
	MN 120	Fundamentals of Engineering Design	3	IDE 020	Engineering design with Computer Appl	3
	EN 100	English Composition	3	ENG 020	Exposition and Argumentation	3
	See Degree Requirements below and Notes on back.					
	EC 215 or EC 225	Principles of Microeconomics or Principles of Macroeconomics	3	ECON 121 or ECON 122	Principles of Microeconomics or Principles of Macroeconomics	3
	US 105 or US 107 or PS 103	American History I or American History II or US Political Systems	3	HIS 175 or HIS 176 or PS 090	American History to 1877 or American History since 1877 or American Government	3
	Free Electives: See Other Required Courses* on back. Electives should be selected in consultation with your advisor. Free electives may not include remedial/deficiency courses, algebra, trigonometry, pre-calculus, or extra credits in required courses.					Free Electives: See Other Required Courses* on back.
Total Hours			41	Total Hours		
Humanities and Social Sciences Electives: Select 2 Additional Courses from the Academic Areas Below*						
See your advisor and Missouri S&T Approved List of Humanities and Social Sciences for more options or email transfercredit@mst.edu for approval.						
Students may also transfer one upper-level humanities/social sciences elective to Missouri S&T.						
Humanities and Social Sciences Electives	US 105	American History I	3	HIS 175	American History to 1877	3
	US 107	American History II	3	HIS 176	American History since 1877	3
	PS 103	US Political Systems	3	PS 090	American Government	3
	AR 112	Perspectives in Art	3	ART 080	Art Appreciation	3
	TH 100	Theatre Appreciation	3	THE 090	Theatre Appreciation	3
	PY 101 or PY 102	Psychological Persp on Human Behavior or Intro to Psychology	3	PSY 050	General Psychology	3
	SO 102	Society, Culture, and Social Behavior	3	SOC 081	General Sociology	3
	PL 110	Reading Philosophy	3	PHIL 005	Intro to Philosophy	3
					Literature Elective	
					Foreign Language	
					Speech and Media Studies	
					Economics	
Total Hours			6-8	Total Hours		
Additional Degree Requirements*						
The following additional courses will satisfy Missouri S&T engineering degree requirements for some, but not all, engineering degrees. Check individual Missouri S&T degree requirements on back for your major.						
Additional Courses (See Back Page for Individual Engineering Major Requirements)	EN 140	Rhetoric and Critical Thinking	3	EN 060	Writing and Research	3
	SC 105	Fundamentals of Oral Communication	3	SPMS 085	Principles of Speech	3
	MA 345	Linear Algebra	3	MATH 208	Linear Algebra I	3
	CH 186, 187	General Chemistry II and Qualitative Analysis	5	CHEM 003, 008	General Chemistry (2nd semester) and Qualitative Analysis	5
	CH 341, 342	Organic Chemistry I and Lab	5	CHEM 221, 226	Organic Chemistry I and Lab	4
	CH 343, 344	Organic Chemistry II and Lab	5	CHEM 223, 228	Organic Chemistry II and Lab	4
	MA 334	Computer Programming	3	CS 73, 77****	Basic Scientific Programming (FORTRAN)	3
	CS 155	Computer Science I	4	CS 74, 78****	Intro to Programming Method and Lab (C++)	3
	CS 265	Computer Science II	3	CS 153	Data Structures	3
	BI 120	Biology Principles	3	BIO 110	General Biology	4
	GO 110	Physical Geology	3	GEO/GE 050	Intro to Physical Geology	3
	EP 240	Circuit Analysis	4	EE 281 (151)**	Circuit Analysis I (Circuits I)*	3
	EP 261	Engineering Mechanics-Statics	3	IDE 050	Engineering Mechanics-Statics	3
	EP 262	Engineering Mechanics-Dynamics	3	IDE 150	Engineering Mechanics-Dynamics	3
Maximum Degree Requirements to be Transferred to Missouri S&T Degree***						68***
A grade of "C" or better is required in calculus and physics, as well as other courses depending on academic major.						
*See notes for individual majors on second page.						
**A passing grade on the Missouri S&T EE Advancement Exam I is required to receive credit for EE 151.						
***Students must receive special permission from Missouri S&T to apply more than 68 credit hours (using Missouri S&T credit-hour totals) toward Missouri S&T degree. Students are not required to complete all courses on this guide before transferring to Missouri S&T.						
****The combination of SEMO MAT 240 and 245 is equivalent to Missouri S&T MATH 022.						
*****SEMO CS 177 Computer Programming for Scientists & Engineers can be substituted for Missouri S&T CS 73/77 or CS 74/78 for Chemical Engineering students only						

Requirements and Notes for Missouri S&T Engineering Majors

The courses listed for each major are required for the Missouri S&T degree and may be taken before transfer to Missouri S&T if they are offered by the transfer school. They are not prerequisites for transfer to Missouri S&T.

Engineering Department	2nd Communication Course	Statistics/ Linear Algebra	Circuits	Statics and Dynamics	2nd Chemistry Course	Computer Science	Humanities/ Social Sciences	Other Required Courses
Aerospace Engineering	EN 060 or EN 160 or SPMS 085	MATH 208 satisfies advanced math/ comp sci elective	EE 281 or 151	IDE 50. AE/ME 160. Dept may substitute IDE 150 for AE/ME 160 if 3D topics are covered.	none	CS 73/77, CS 74/78, or CS 53/54	Literature required.	ME 219. IDE 110. Up to 6 hours of free electives.
Architectural Engineering	EN 060 or EN 160 or SPMS 085	STAT 213	EE 281 or 151	IDE 50. IDE 150.	none	CS 73/77, CS 74/78, or CS 53/54 will be substituted for ARCHE 003	Students are advised to take HIS 175 or 176, which will satisfy the prerequisite for a required upper level history course at Missouri S&T.	ME 227. IDE 110. IDE 120. Up to 6 hours of free electives.
Ceramic Engineering	None required. EN 060, EN 160, or SPMS 085 will count as Gen Ed electives	STAT 213,215, or 217	none	IDE 50.	CHEM 003 may be taken in place of MTE 125.	none		IDE 110. CHEM 221/222 will satisfy technical elective requirement. No free electives applied towards degree.
Chemical Engineering	EN 060 or EN 160 or SPMS 085	none	none	IDE 50 is not required but is recommended as a free elective. Up to 6 hours of free electives.	CHEM 003	CS 73/77, CS 74/78, or CS 53/54		CHEM 221, 222, 223, 224. Students transferring in the fall are strongly encouraged to take CHENG 120 and 141 at Missouri S&T the summer before they transfer. ME 219 (227) may be used as a substitution for CHENG 141, if necessary. Spring semester transfers may take CHENG 120 and 141 the first semester at Missouri S&T.
Civil Engineering	EN 060 or EN 160 or SPMS 085	STAT 213	none	IDE 50. IDE 150.	none	CS 73/77, CS 74/78, or CS 53/54 will be substituted for CVE 003		GEO/GE 050. IDE 110. IDE 120. Up to 6 hours of free electives.
Computer Engineering	SPMS 085 is required	STAT 217 MATH 208 satisfies mathematics elective	EE 151 and passing score on EE Advancement Exam	IDE 050 + 150 will satisfy science elective requirement.	none	CS 53/54 and CS 153 required.		Up to 6 hours of free electives.
Electrical Engineering	SPMS 085 is required	STAT 217 MATH 208	EE 151 and passing score on EE Advancement Exam	IDE 050 + 150 will satisfy science elective requirement.	none	CS 53/54		Up to 6 hours of free electives.
Engineering Management	EN 160 AND either EN 060 or SPMS 085 are required	STAT 211, 213, or 215	EE 281 or 151	IDE 50. IDE 150.	none	CS 74/78 or CS 53/54	PSY 050 General Psychology required	ME 227. IDE 110. IDE 120. Up to 6 hours of free electives.
Environmental Engineering	EN 060 or EN 160 or SPMS 085	STAT 213	none	IDE 50 + IDE 150 will be substituted for IDE 140.	CHEM 003	none	Students are advised to take HIS 175 or 176, which will satisfy the prerequisite for a required upper level history course at Missouri S&T.	BIOSC 110. GEO/GE 050. ME 227. Up to 6 hours of free electives.
Geological Engineering	SPMS 085 or EN 160	none	none	IDE 50. IDE 150.	none	none		GEO/GE 050. IDE 110. No free electives applied towards degree.
Interdisciplinary Engineering	EN 060 or EN 160 or SPMS 085	STAT 213, 215, or 217	EE 151 and passing score on EE Advancement Exam	IDE 50. IDE 150.	none	CS 73/77, CS 74/78, or CS 53/54		ME 227. IDE 110. IDE 120. Up to 6 hours of free electives.
Mechanical Engineering	EN 060 or EN 160 or SPMS 085	MATH 208, STAT 213, or STAT 215 satisfies math/stat or comp sci elective	EE 281 or 151	AE/ME 160. Dept may substitute IDE 150 if 3D topics are covered.	none	CS 73/77, CS 74/78, or CS 53/54	Literature required.	ME 219. MTE 121. IDE 110. IDE 120. Up to 6 hours of free electives.
Metallurgical Engineering	EN 060 or EN 160 or SPMS 085	STAT 213 or 215	EE 281 or 151	IDE 50.	none	none		MTE 121. IDE 110. Up to 5 hours of free electives.
Mining Engineering	EN 060 or EN 160	STAT 213	none	IDE 50. IDE 150. (IDE 50+150 will be substituted for IDE 140. IDE 50+110+150 will be substituted for MiEng 232.)	none	none		GEO/GE 050. MTE 121 is technical elective. No free electives applied towards degree.
Nuclear Engineering	EN 060 or EN 160	STAT 215	none	IDE 50	none	CS 73/77, CS 74/78, or CS 53/54		MTE 121. Up to 6 hours of free electives.
Petroleum Engineering	EN 060 or EN 160 or SPMS 085	STAT 213 or 215 satisfies advanced math/stat elective	EE 281 or 151	IDE 50 + IDE 150 will be substituted for	none	CS 74/78 or CS 53/54		GEO/GE 050. ME 227. IDE 110. No free electives applied towards degree.