Department of Mathematics, Physical Sciences and Engineering

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Faculty: Ambrose, Carlisle, Chen, Combs, Cruz, Davis, Espinosa, Fisher, Lockwood-Cooke, Mitra, Moreland, Palamara, Peppard, Ratheal, Van Doren, Walls, Woodyard.

The Department of Mathematics, Physical Sciences and Engineering combines the varied disciplines of chemistry, engineering, engineering technology, mathematics and physics. Commitment to excellence in classroom instruction designed for producing society-ready graduates in these disciplines is the primary goal of the department. The department has a broad range of talented faculty with expertise in specific areas of science and technology that demand quality graduates.

Students may pursue degree programs in the traditional scientific or technical disciplines within the department or they may pursue integrated programs in areas such as biochemistry, pre-medicine, pre-engineering or specific teaching fields. Secondary teacher certification in the areas of mathematics and physical science are a vital part of the departmental program. The department frequently integrates its programs with other programs within the University to produce a study track that will meet the individual student's desired educational goals.

Chemistry

The chemistry discipline provides excellent instruction and hands-on experience to a diverse group of majors. In addition to science and technology in the classroom, there is ample opportunity for laboratory research and special topic studies at the undergraduate level. Whether a student's final employment goal is chemistry, biochemistry, medical school, graduate school or industry, students will be well prepared with a degree in chemistry from this program. The chemistry program also offers courses to support secondary education certification in physical science.

Engineering Technology

The engineering technology curriculum combines an emphasis on understanding engineering and technical fundamentals with real-life applications in manufacturing and industry. Two options are available within the engineering technology degree program. The first option prepares students for careers in industry and manufacturing. The second option contains much of the same technical background but adds emphasis in management and marketing, thus preparing students for careers in industrial management and sales. Engineering technology majors can participate in a cooperative education program that combines classroom study with a planned program of related work experience with industry or government agencies in the Texas Panhandle area. Students may also participate in industrial internships arranged through the engineering technology internship program.

Mathematics

Mathematics faculty are involved in both pure and applied mathematics research along with grant activities using inquiry-based mathematics instruction. Students pursuing traditional mathematics or mathematics education programs are encouraged to develop strong computer proficiencies to meet the mathematical needs of a technological society. For more information, refer to the "Division of Education" section of this catalog.

Mechanical Engineering

The mechanical engineering program prepares students for careers in industry involving design and development of mechanical systems. This curriculum provides the mathematics and physical science background required for all engineering programs, as well as specialization courses in mechanical engineering.

Pre-Engineering Program

The pre-engineering program prepares students for transfer to another four-year university to complete their degree in engineering disciplines other than mechanical engineering. Curriculum in pre-engineering emphasizes thorough grounding in mathematics, physics and chemistry, universally required by all engineering programs. Environmental science majors can structure their degree plan to include pre-engineering curriculum to pursue a degree in environmental engineering.

Physics

The physics program offers both algebra-based and calculus-based introductory physics courses that are required by several university degree programs. A full-range of upper-level physics courses taught by members of The Texas A&M University System can be taken to meet the bachelor of science degree in physics or as electives by majors in other technically demanding fields. The physics program also offers courses to support secondary education certification in physical science. For more information, refer to the "Division of Education" section of this catalog.

Faculty specializations include dielectric properties, physics education and astronomy. Physics majors may find employment, study and research opportunities at the internationally respected Alternative Energy Institute (AEI). AEI is located on the WTAMU campus and maintains a wind- and solar-energy test site north of the campus. Science education and physics majors interested in careers in teaching may gain experience both in traditional and technology-based instruction as undergraduate teaching assistants in physics laboratories.

Department of Mathematics, Physical Sciences and Engineering

Discipline	Course Prefix
Chemistry	CHEM
Engineering	ENGR
Engineering Technology	ET
Mathematics and Physical Science	MPS
Mathematics	MATH
Mechanical Engineering	MENG
Natural Sciences	NSCI
Physics	PHYS

NOTE: See the "Academic Courses and Abbreviations" and "Course Descriptions" sections of this catalog for a complete list of courses offered by the University.

Bachelor of Arts (B.A.)/ Bachelor of Science (B.S.) Degree

Requirements

May be either depending on option selected; see the "Requirement for Baccalaureate Degrees" section of this catalog.

Major in Chemistry (Major Code: 104)

A student must complete a minimum of 127 semester credit hours to include at least 36 advanced hours.

University Core Curriculum Requirements

Refer to the "University Core Curriculum" section of this catalog.

Option I—Professional Chemistry

This option follows course recommendations of the American Chemical Society and prepares students for positions in industry, government and education. It is recommended for students planning to do graduate study in chemistry or seeking employment as chemists in industry.

- CHEM 1411, 1412, 2523, 2525, 3511, 3521, 3522, 4411, 4323, 4223L, 4431, 4397.
- MATH 1316 or 1348, 2413, 2414, 3340.
- PHYS 2425, 2426 and two hours of 3095.
- Additional hours to meet the minimum University requirement for a degree.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option I
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
CHEM 1401 .....4 hrs.	CHEM 1402 ....4 hrs.	CHEM 2523 .....5 hrs.	CHEM 2525 .....5 hrs.
MATH 1314 .....3 hrs.	MATH 1316	MATH 2413 .....4 hrs.	CHEM 3511 .....5 hrs.
ENGL 1301 .....3 hrs.	or 1348.....3 hrs.	ENGL 2371,	MATH 2414 .....4 hrs.
HIST 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	HIST 2372	ENGL 2332
PHED	SCOM 1315	or PHIL 1301 ....3 hrs.	or 2333 ..... 3 hrs.
activity ..... 1 hr.	or 1321.....3 hrs.	HIST 1302 .....3 hrs.	17 hrs.
14 hrs.	Visual/Performing	POSC 2305 ..... 3 hrs.	
	arts core .....3 hrs.	18 hrs.	
	PHED 1111 ... 1 hr.		
	17 hrs.		
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
CHEM 3521 .....5 hrs.	CHEM 3522 ....5 hrs.	CHEM 4323 .....3 hrs.	CHEM 4397 .....3 hrs.
PHYS 2425	PHYS 2426 .....4 hrs.	CHEM 4431 ..4-5 hrs.	CHEM 4411 .....4 hrs.
w/lab .....4 hrs.	MATH 3340 .....3 hrs.	CHEM 4223L ...2 hrs.	ANTH 2351,
PHYS 3095 .....2 hrs.	B.A.	POSC 2306.....3 hrs.	ECON 2301,
B.A.	requirement .. 3-4 hrs.	B.A.	GEOG 1302,
requirement ... 3-4 hrs.	15-16 hrs.	requirement ... 3-4 hr.	PSYC 2301 or
13-14 hrs.		15-17 hrs.	SOCI 2301 .....3 hrs.
			B.A.
			requirement ..3-4 hrs.
			Elective .... 2 hrs.
			15-16 hrs.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option I,
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	ENGL 2371,	CHEM 2525 .....5 hrs.
MATH 1314 .....3 hrs.	MATH 1316	HIST 2372	CHEM 3511 .....5 hrs.
HIST 1301 .....3 hrs.	or 1348.....3 hrs.	or PHIL 1301 ....3 hrs.	MATH 2414 .....4 hrs.
CHEM 1401 .....4 hrs.	SCOM 1315	HIST 1302 .....3 hrs.	ENGL 2332
PHED	or 1321.....3 hrs.	POSC 2305.....3 hrs.	or 2333 ..... 3 hrs.
activity ..... 1 hr.	Visual/Performing	MATH 2413 .....4 hrs.	17 hrs.
14 hrs.	arts core .....3 hrs.	CHEM	
	CHEM 1402 ....4 hrs.	2523 ..... 5 hrs.	
	PHED 1111 ... 1 hr.	18 hrs.	
	17 hrs.		
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
CHEM 3521 .....5 hrs.	CHEM 3522 .....5 hrs.	CHEM 4323 .....3 hrs.	CHEM 4397 .....3 hrs.
PHYS 2425 .....4 hrs.	PHYS 2426 .....4 hrs.	CHEM 4431 .....4 hrs.	CHEM 4411 .....4 hrs.
PHYS 3095 .....2 hrs.	MATH 3340 .....3 hrs.	POSC 2306.....3 hrs.	ANTH 2351,
Elective ..... 3 hrs.	Elective ..... 3 hrs.	Elective ..... 4 hrs.	ECON 2301,
14 hrs.	15 hrs.	16 hrs.	GEOG 1302,
			PSYC 2301 or
			SOCI 2301 .....3 hrs.
			Elective ..... 6 hrs.
			16 hrs.

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Option II—General Chemistry

This option provides a background for students whose career goals are to enter education or chemistry-related fields.

- CHEM 1411, 1412, 2523, 2525, 3511, three courses from 3521, 3522, 4411, 4323, 4223L, 4324, 4224L, 4431.
- MATH 1316 or 1348, 2413, 2414.
- PHYS 1401 or 2425, 1402 or 2426.
- Additional advanced hours to provide a minimum of 36 hours selected from chemistry, mathematics, biology, computer information systems, physics, environmental science or geology.
- Additional hours to meet the minimum University requirement for a degree.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option II
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
CHEM 1411 .....4 hrs. MATH 1314 .....3 hrs. ENGL 1301 .....3 hrs. HIST 1301 .....3 hrs. PHED activity ..... 1 hr. 14 hrs.	CHEM 1412 ....4 hrs. MATH 1316 or 1348.....3 hrs. ENGL 1302 .....3 hrs. SCOM 1315 or 1321.....3 hrs. Visual/Performing arts core .....3 hrs. PHED 1111 ... 1 hr. 17 hrs.	CHEM 2523 .....5 hrs. MATH 2413 .....4 hrs. ENGL 2332 or 2333 .....3 hrs. HIST 1302 .....3 hrs. POSC 2305 .... 3 hrs. 18 hrs.	CHEM 2525 .....5 hrs. CHEM 3511 .....5 hrs. MATH 2414 .....4 hrs. ANTH 2351, ECON 2301, GEOG 1302, PSYC 2301 or SOCI 2301 ..... 3 hrs. 17 hrs.
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
PHYS 1401 or 2425 .....4 hrs. ENGL 2371, HIST 2372 or PHIL 1301 ....3 hrs. POSC 2306.....3 hrs. Adv. elective .....3 hrs. B.A. requirement ... 3-4 hrs. 16-17 hrs.	CHEM* .....4-5 hrs. PHYS 1402 or 2426.....4 hrs. Elective*** .....3-6 hrs. B.A. requirement ... 3-4 hrs. 14-19 hrs.	CHEM* .....4-5 hrs. Adv. elective .....3 hrs. Adv. elective .....3 hrs. Elective** .....3 hrs. B.A. requirement ... 3-4 hrs. 16-18 hrs.	CHEM* .....4-5 hrs. Adv. elective .....3 hrs. Adv. elective .....3 hrs. B.A. requirement ... 3-4 hrs. 13-15 hrs.

*Choose three—CHEM 3521, 3522, 4411, 4323/4323L ,4323/4223L, 4431.
**Elective hours to be determined based on hours remaining to complete degree.
***May need to be advanced depending on other course selections.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option II
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs. MATH 1314 .....3 hrs. HIST 1301 .....3 hrs. CHEM 1411 w/lab .....4 hrs. PHED activity ..... 1 hr. 14 hrs.	ENGL 1302 .....3 hrs. MATH 1316 or 1348.....3 hrs. SCOM 1315 or 1321.....3 hrs. Visual/Performing arts core .....3 hrs. CHEM 1412 ....4 hrs. PHED 1111 ... 1 hr. 17 hrs.	ENGL 2332 or 2333 .....3 hrs. HIST 1302 .....3 hrs. POSC 2305.....3 hrs. MATH 2413 .....4 hrs. CHEM 2523 ..... 5 hrs. 18 hrs.	CHEM 2525 .....5 hrs. CHEM 3511 .....5 hrs. MATH 2414 .....4 hrs. POSC 2306.... 3 hrs. 17 hrs.
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 2371, HIST 2372 or PHIL 1301 .....3 hrs. ANTH 2531, ECON 2301, GEOG 1302, PSYC 2301 or SOCI 2301 .....3 hrs. PHYS 1401 or 2425 .....4 hrs. Elective .....3 hrs. Adv. elective .....3 hrs. Adv. elective ..... 4 hrs. 17-18 hrs.	CHEM* .....4-5 hrs. PHYS 1402 or 2426.....4 hrs. Elective*** .....3-6 hrs. Adv. elective .... 3 hrs. 14-18 hrs.	CHEM* .....4-5 hrs. Adv. elective .....3 hrs. Adv. elective .....3 hrs. Elective** .. 2 hrs. 12-13 hrs.	CHEM* .....4-5 hrs. Elective .....3 hrs. Elective .....3 hrs. Elective** ... 0-5 hrs. 12-18 hrs.

*Choose three—CHEM 3521, 3522, 4411, 4323/4223L 4324, 4224L, 4431.
**Elective hours to be determined based on hours remaining to complete degree.
***May need to be advanced depending on other course selections.

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Option III—Biochemistry

This option is for students planning careers using chemistry applied to medical science, including pre-medical students and other pre-professional students.

- CHEM 1411, 1412, 2523, 2525, 3511, 4323, 4223L, 4324, 4224L.
- BIOL 1406 or 1413, 1407 or 1411, 2572, 3301, 3402 and one course from 3440 or 4375.
- MATH 1316 or 1348, 2413.
- PHYS 1401 or 2425; 1402 or 2426.
- MATH 2414 is recommended.
- Additional advanced hours to provide a minimum of 36 hours selected from chemistry, mathematics, biology, computer information systems, physics, environmental science or geology.
- Additional hours to meet the minimum University requirement for a degree.

For information about the master of science (M.S.) degree in chemistry, refer to the "Graduate School" section of this catalog.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option III, Biochemistry
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	BIOL 2572 .....5 hrs.	Humanities
MATH 1314 .....3 hrs.	MATH 1316	MATH 2413 .....4 hrs.	core .....3 hrs.
BIOL 1406	or 1348.....3 hrs.	CHEM 2523 .....5 hrs.	BIOL 3301 .....3 hrs.
or 1413 .....4 hrs.	BIOL 1407	PHED	CHEM 3511 .....5 hrs.
CHEM 1411 .....4 hrs.	or 1411.....4 hrs.	activity .....1 hr.	CHEM 2525 ...5 hrs.
B.A.	CHEM 1412 ....4 hrs.	15 hrs.	16 hrs.
requirement ..3-4 hrs.	PHED 1111 ...1 hr.		
17-18 hrs.	15 hrs.		

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
Humanities	BIOL 3440	CHEM 4323 .....3 hrs.	CHEM 4333 .....3 hrs.
core .....3 hrs.	or 4375 .....3-4 hrs.	CHEM 4223L ....2 hrs.	CHEM 4224L ....2 hrs.
BIOL 3402	Social/Behavioral	Social/Behavioral	B.A.
w/lab .....4 hrs.	core .....3 hrs.	core .....3 hrs.	requirement ..3-4 hrs.
Social/	PHYS 1402	Social/Behavioral	Social/Behavioral
Behavioral core ...3 hrs.	or 2426.....4 hrs.	core .....3 hrs.	core .....3 hrs.
PHYS 1401	Adv. elective ....3 hrs.	B.A.	Adv. elective* ...1-2 hrs.
or 2425 .....4 hrs.	SCOM 1315	requirement ...3-4 hrs.	B.A.
Adv. elective .....3 hrs.	or 1321 ....3 hrs.	14-15 hrs.	requirement ...3-4 hrs.
Visual/Performing	16-17 hrs.		15-18 hrs.
arts core ..... 3 hrs.			
17 hrs.			

*Elective hours to be determined based on hours remaining to complete degree.

Curriculum Guide (suggested course sequence)

Major in Chemistry—Option III, Biochemistry
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
CHEM 1411 .....4 hrs.	CHEM 1412 ....4 hrs.	CHEM 2523 .....5 hrs.	CHEM 2525 .....5 hrs.
MATH 1314 .....3 hrs.	MATH 1316	MATH 2413 .....4 hrs.	CHEM 3511 .....5 hrs.
BIOL 1406 .....4 hrs.	or 1348.....3 hrs.	BIOL 2572 .....5 hrs.	BIOL 3301 .....3 hrs.
ENGL 1301 .....3 hrs.	BIOL 1407	Humanities	Humanities
PHED	or 1411.....4 hrs.	core .....3 hrs.	core .....3 hrs.
activity .....1 hr.	ENGL 1302 .....3 hrs.	17 hrs.	16 hrs.
15 hrs.	PHED 1111 ...1 hr.		
	15 hrs.		

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
BIOL 3402 .....4 hrs.	BIOL 3440	CHEM 4323 .....3 hrs.	CHEM 4324 .....3 hrs.
PHYS 1401	or 4375 .....3-4 hrs.	CHEM 4223L ....2 hrs.	CHEM 4224L ....2 hrs.
or 2425 .....4 hrs.	PHYS 1402	Social/Behavioral	Social/Behavioral
Social/Behavioral	or 2426.....4 hrs.	core .....3 hrs.	core .....3 hrs.
core .....3 hrs.	Social/Behavioral	Social/Behavioral	Elective .....4 hrs.
Visual/Performing	core .....3 hrs.	core .....3 hrs.	Adv.
arts core.....3 hrs.	Adv. elective ....3 hrs.	Elective** .....3 hrs.	elective* ....1-2 hrs.
Adv. elective ..3 hrs.	SCOM 1315	Adv.	13-14 hrs.
17 hrs.	or 2321 ....3 hrs.	elective .....3 hrs.	
	16-17 hrs.	17 hrs.	

*Elective hours to be determined based on hours remaining to complete degree.
***May need to be advanced depending on other course selections.

Department of Mathematics, Physical Sciences and Engineering

Major in Mathematics (Major Code: 115)

University Core Curriculum Requirements

Refer to the "University Core Curriculum" section of this catalog. A student must complete a minimum of 127 semester credit hours to include at least 36 advanced hours.

NOTE: MPS 4097 and 4398 may be applied to the major in physics. MPS 4393 is the honors course for the department.

- MATH 1316 or 1348, 2413, 2414 and 3306 or 3316.
- Mathematics majors seeking teacher certification must take MATH 3306, and those not seeking teacher certification must take MATH 3316.
- MATH—38 semester hours including core courses listed above, 3311, 4341 and 18 semester hours from 3321, 3340, 3342, 4310, 4340, 4361, 4362.
- PHYS 1401 or 2425; 1402 or 2426.

Curriculum Guide (suggested course sequence)

Major in Mathematics
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 1314 .....3 hrs.	MATH 1316	core .....3 hrs.	core .....3 hrs.
Social/Behavioral	or 1348 .....3 hrs.	Social/Behavioral	Social/Behavioral
core .....3 hrs.	Social/Behavioral	core .....3 hrs.	core ..... 3 hrs.
Visual/Performing	core .....3 hrs.	B.A.	B.A
arts core .....3 hrs.	SCOM 1315	requirement ..3-4 hrs.	requirement ..3-4 hrs.
PHED	or 1321 .....3 hrs.	MATH 2413 .....4 hrs.	MATH 2414 .....4 hrs.
activity .....1 hr.	Elective .....3 hrs.	PHYS 1401	PHYS 1402
13 hrs.	PHED 1111 ...1 hr.	or 2425	or 2426
	16 hrs.	w/lab .....4 hrs.	w/lab .....4 hrs.
		17-18 hrs.	17-18 hrs

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MATH 3306	MATH* .....3 hrs.	MATH* .....3 hrs.	MATH 4341 .....3 hrs.
or 3316 .....3 hrs.	MATH* .....3 hrs.	MATH* .....3 hrs.	MATH* .....3 hrs.
MATH 3311 .....3 hrs.	B.A.	Adv. elective .....3 hrs.	Elective .....3 hrs.
B.A.	requirement ..3-4 hrs.	Elective .....6 hrs.	Elective** ...3-7 hrs.
requirement ..3-4 hrs.	Adv. elective ....3 hrs.	15 hrs.	12-16 hrs.
Adv. elective .....3 hrs.	Elective ....3 hrs.		
MATH* .....3 hrs.	15-16 hrs.		
Social/Behavioral			
core .....3 hrs.			
18-19 hrs.			

*Choose six courses—MATH 3321, 3340, 3342, 4310, 4340, 4361, 4362.
**Elective hours to be detemined based on hours remaining to complete degree.

Curriculum Guide (suggested course sequence)

Major in Mathematics
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 1314 .....3 hrs.	MATH 1316	core .....3 hrs.	core .....3 hrs.
Social/Behavioral	or 1348 .....3 hrs.	Social/Behavioral	Elective .....3 hrs.
core .....3 hrs.	SCOM 1315	core .....3 hrs.	Social/Behavioral
Visual/Performing	or 1321 .....3 hrs.	Elective .....3 hrs.	core ..... 3 hrs.
arts core ..... 3 hrs.	Social/Behavioral	MATH 2413 .....4 hrs.	MATH 2414 .....4 hrs.
PHED	core .....3 hrs.	PHYS 1401 or	PHYS 1402
activity .....1 hr.	PHED 1111 ...1 hr.	2425 w/lab .....4 hrs.	or 2426
13 hrs.	13 hrs.	17 hrs.	w/lab .....4 hrs.
			17 hrs.

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MATH 3306	MATH* .....3 hrs.	MATH* .....3 hrs.	MATH 4341 .....3 hrs.
or 3316 .....3 hrs.	MATH* .....3 hrs.	MATH* .....3 hrs.	MATH* .....3 hrs.
MATH 3311 .....3 hrs.	Elective .....3 hrs.	Adv. elective .....3 hrs.	Adv. elective .....3 hrs.
MATH* .....3 hrs.	Elective .....3 hrs.	Adv. elective .....3 hrs.	Elective .....3 hrs.
Elective .....3 hrs.	Elective .....3 hrs.	Elective .....4 hrs.	Elective .....3 hrs.
Elective .....3 hrs.	15 hrs.	16 hrs.	15 hrs.
Social/Behavioral			
core .....3 hrs.			
18 hrs.			

*Choose six courses—MATH 3321, 3340, 3342, 4310, 4340, 4361, 4362.
**Elective hours to be detemined based on hours remaining to complete degree.

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Engineering Mathematics Option

- MATH 1316 or 1348, 2413, 2414, 3316, 3321, 3340, 3311, 4340, 4341, 4361, 4362.
- CHEM 1411, 1412.
- Two advanced CIS courses.
- ENGR 1304.
- PHYS 1401 or 2425; 1402 or 2426 and six hours from advanced physics.

For more information about the master of science (M.S.) degree in mathematics, refer to the "Graduate School" section of this catalog.

Curriculum Guide (suggested course sequence)

Major in Mathematics—Engineering Mathematics Option
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 1314 .....3 hrs.	MATH 1316	core .....3 hrs.	core .....3 hrs.
ENGR 1304.....3 hrs.	or 1348.....3 hrs.	CIS 1315	Social/Behavioral
Social/Behavioral	SCOM 1315	(prerequisite) ....3 hrs.	core .....3 hrs.
core .....3 hrs.	or 1321.....3 hrs.	Social/Behavioral	MATH 2414 .....4 hrs.
CHEM 1411 .....4 hrs.	Social/Behavioral	core .....3 hrs.	PHYS 1402
PHED	core .....3 hrs.	MATH 2413 .....4 hrs.	or 2426 ..... 4 hrs.
activity ..... 1 hr.	CHEM 1412 ....4 hrs.	PHYS 1401	17 hrs.
17 hrs.	PHED 1111 ... 1 hr.	or 2425 ..... 4 hrs.	
	17 hrs.	17 hrs.	

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MATH 3316 .....3 hrs.	MATH 3340 .....3 hrs.	MATH 3311 .....3 hrs.	MATH 3321
MATH 3342 .....3 hrs.	Adv. CIS .....3 hrs.	MATH 4340	or 4361 .....3 hrs.
Adv. CIS.....3 hrs.	Adv. PHYS .....3 hrs.	or 4362 .....3 hrs.	MATH 4341 .....3 hrs.
Adv. PHYS .....3 hrs.	MATH 3321	B.A.	B.A.
MATH 4340	or 4361 .....3 hrs.	requirement ..3-4 hrs.	requirement .. 6-8 hrs.
or 4362 ..... 3 hrs.	Visual/Performing	Social/Behavioral	15-17 hrs.
15 hrs.	arts core ..... 3 hrs.	core ..... 6-8 hrs.	
	15 hrs.	15-17 hrs.	

Elective hours to be determined based on hours remaining to complete degree.

Curriculum Guide (suggested course sequence)

Major in Mathematics—Engineering Mathematics Option
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 1314 .....3 hrs.	MATH 1316	core .....3 hrs.	core .....3 hrs.
ENGR 1304.....3 hrs.	or 1348.....3 hrs.	CIS 1315	CIS 2330
Social/Behavioral	SCOM 1315	(prerequisite) ....3 hrs.	(prerequisite) ....3 hrs.
core .....3 hrs.	or 1321.....3 hrs.	Social/Behavioral	Visual/Performing
CHEM 1411 .....4 hrs.	Social/Behavioral	core .....3 hrs.	arts core.....3 hrs.
PHED	core .....3 hrs.	MATH 2413 .....4 hrs.	MATH 2414 .....4 hrs.
activity ..... 1 hr.	CHEM 1412 ....4 hrs.	PHYS 1401	PHYS 1402
17 hrs.	PHED 1111 ... 1 hr.	or 2425	or 2426 ..... 4 hrs.
	17 hrs.	w/lab ..... 4 hrs.	17 hrs
		17 hrs.	

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MATH 3316 .....3 hrs.	MATH 3340 .....3 hrs.	MATH 3331 .....3 hrs.	MATH 3321
MATH 3342 .....3 hrs.	adv. CIS .....3 hrs.	MATH 4340	or 4361 .....3 hrs.
Adv. CIS.....3 hrs.	Adv. PHYS .....3 hrs.	or 4362 .....3 hrs.	MATH 4341 .....3 hrs.
Adv. PHYS .....3 hrs.	MATH 3321	Social/Behavioral	Social/Behavioral
MATH 4340	or 4361.....3 hrs.	core .....3 hrs.	core .....3 hrs.
or 4362 ..... 3 hrs.	Elective ..... 3 hrs.	Elective ..... 6 hrs.	Elective .....6 hrs.
15 hrs.	15 hrs.	15 hrs.	Elective** ..... 2 hrs.
			17 hrs.

Elective hours to be determined based on hours remaining to complete degree.

Department of Mathematics, Physical Sciences and Engineering

Major in Physics (Major Code: 118)

A student must complete a minimum of 127 semester credit hours to include at least 36 advanced hours.

University Core Curriculum Requirements

Refer to the "University Core Curriculum" section of this catalog.

Physics Requirements

- PHYS 2425, 2426, 2427, 3310, 3320, 3330, 3340, 4320, 4340, 4340.
- Nine hours from PHYS 3342, 3350, 4310, 4350, 4360, 4370 and 4380.
- MATH 2413, 2414, 3340, 3342.
- CIS 1315.

Recommended Courses

- MATH 3311, 4310.

Curriculum Guide (suggested course sequence)

Major in Physics
Bachelor of Arts Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 2413 .....3 hrs.	MATH 2414 .....4 hrs.	core .....3 hrs.	core .....3 hrs.
CHEM 1411 .....4 hrs.	CHEM 1412 ....4 hrs.	CIS 1315 .....3 hrs.	MATH 3340 .....3 hrs.
Social/Behavioral	PHYS 2425 ... 4 hrs.	SCOM 1315	PHYS 2427 ..... 4 hrs.
core .....3 hrs.	15 hrs.	or 1321 .....3 hrs.	PHYS 3320 .....3 hrs.
Visual/Performing		PHYS 2426 .....4 hrs.	Social/
arts core.....3 hrs.		MATH 3342 .....3 hrs.	Behavioral
PHED 1111 .... 1 hr.		PHED	core ..... 3 hrs.
17 hrs.		activity ..... 1 hr.	16 hrs.
		17 hrs.	

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
B.A.	PHYS	PHYS	PHYS
requirement ..3-4 hrs.	4430***** .....3 hrs.	3310***** .....3 hrs.	4310***** .....3 hrs.
PHYS 3330 .....3 hrs.	PHYS	PHYS 3095 .....3 hrs.	PHYS
PHYS 3340 .....3 hrs.	4440***** .....3 hrs.	PHYS**** .....3 hrs.	4320***** .....3 hrs.
MATH	B.A.	Elective .....1 hr.	PHYS**** .....3 hrs.
3311*** .....3 hrs.	requirement ..3-4 hrs.	Social/	B.A.
Social/	MATH	Behavioral	requirement ..3-4 hrs.
Behavioral	4310*** .....3 hrs.	core ..... 3 hrs.	Social/
core ..... 3 hrs.	Social/	16-17 hrs.	Behavioral
15-16 hrs.	Behavioral		core ..... 6 hrs.
	core ..... 3 hrs.		15-16 hrs.
	15-16 hrs.		

**PHYS 3095—one to three hours at a time; may be repeated; see catalog.
***Recommended.
****Choose three courses from PHYS 3350, 4310, 4350, 4360, 4370 and 4380.
*****These courses are offered on a two-year rotation by TTVN. Check rotation schedule for courses to be offered during given semester.

Curriculum Guide (suggested course sequence)

Major in Physics
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Humanities	Humanities
MATH 2413 .....3 hrs.	MATH 2414 .....4 hrs.	core .....3 hrs.	core .....3 hrs.
CHEM 1411 .....4 hrs.	CHEM 1412 ....4 hrs.		MATH 3340 .....3 hrs.
Social/Behavioral	PHYS 2425 ... 4 hrs.	CIS 1315 .....3 hrs.	PHYS 2427 .....4 hrs.
core .....3 hrs.	15 hrs.	SCOM 1315	PHYS 3320 .....4 hrs.
Visual/Performing		or 1321 .....3 hrs.	Social/Behavioral
arts core.....3 hrs.		PHYS 2426 .....4 hrs.	core ..... 3 hrs.
PHED 1111 .... 1 hr.		MATH 3342 .....3 hrs.	16 hrs.
17 hrs.		PHED	
		activity ..... 1 hr.	
		17 hrs.	

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MATH 3342 .....3 hrs.	PHYS	PHYS	PHYS
PHYS 3330 .....3 hrs.	4430***** .....3 hrs.	3310***** .....3 hrs.	4320***** .....3 hrs.
PHYS 3340 .....3 hrs.	PHYS	PHYS	PHYS**** .....3 hrs.
MATH	4440***** .....3 hrs.	3095***** .....3 hrs.	PHYS**** .....3 hrs.
3311*** .....3 hrs.	Elective .....3 hrs.	PHYS**** .....3 hrs.	Elective .....3 hrs.
Social/Behavioral	MATH 4310*** .5 hrs.	Elective .....3 hrs.	Elective ..... 1 hr.
core ..... 3 hrs.	Social/Behavioral	Social/Behavioral	13 hrs.
17 hrs.	core ..... 3 hrs.	core ..... 3 hrs.	
	17 hrs.	15 hrs.	

**PHYS 3095—one to three hours at a time; may be repeated; see catalog.
***Recommended.
****Choose two courses—PHYS 390, 404, 410, 411, MPS 498.
*****Choose three courses from PHYS 3350, 4310, 4350, 4360, 4370 and 4380. These courses are offered on a two-year rotation by TTVN. Check rotation schedule for courses to be offered during a given semester.

Department of Mathematics, Physical Sciences and Engineering

Bachelor of Science (B.S.) Degree

Major in Engineering Technology
(Major Code: 112)

A student must complete a minimum of 127 semester credit hours to include at least 36 advanced hours.

University Core Curriculum Requirements

Refer to the "University Core Curriculum" section of this catalog. Students must take PHYS 1401 and 1402, and MATH 1314 (Option I) or 1324 (Option II).

Option I—Industrial/Manufacturing

- ENGR 1301, 1304, 1315, 2301, 2302.
- ET 2371, 2372, 2375, 3301, 3360, 4314, 4370, 4380 and four courses from 3315, 3330, 4301, 4311, 4325, 4330.
- CHEM 1411, 1412; ENGL 2311; MATH 1316 or 1348, MATH 2413.
- Select four courses from upper-level ET electives (or math, CIS, management, ENGR or other courses after consulting with an adviser).
- Additional hours to meet the minimum University requirement for a degree.

Option II—Distribution

- ENGR 1301, 1304, 1315, ET 2371, 2372, 4380.
- ET 3301, 3360, 4311, 4314, 4340, 4370 and four courses from 3315, 3330, 4301, 4325, 4330.
- CHEM 1411, 1412; ENGL 2311; MATH 1325.
- Select four courses from MGT 3330, 4311, 4330, MKT 3340, 3342, 3350, 4340, 4346.
- Additional hours to meet the minimum University requirement for a degree.

Teacher Certification

Consult the "Division of Education" section of this catalog for general education and certification major requirements related to programs offered by this department.

For information about the master of science (M.S.) degree in engineering technology, refer to the "Graduate School" section of this catalog.

Curriculum Guide (suggested course sequence)

Major in Engineering Technology—Option I

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	MATH 2413 .....4 hrs.	ET 2375 .....3 hrs.
MATH 1314	MATH 1316	SCOM 1315 .....3 hrs.	ENGL 2311 .....3 hrs.
or 1324 .....3 hrs.	or 1348.....3 hrs.	ET 2371 .....3 hrs.	ET 2372 .....3 hrs.
ENGR 1315 .....3 hrs.	ENGR 1301 .....3 hrs.	Social/Behavioral	PHYS 1402 .....4 hrs.
ENGR 1304 .....3 hrs.	CHEM 1412 ....4 hrs.	core .....3 hrs.	Humanities
CHEM 1411 ....4 hrs.	Visual/Performing	PHYS 1401 ....4 hrs.	core .....3 hrs.
16 hrs.	arts .....3 hrs.	17 hrs.	PHED 1111 ....1 hr.
	16 hrs.		17 hrs.
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ET 3360 .....3 hrs.	ET 3301 .....3 hrs.	ET 4314 .....3 hrs.	ET 4370 .....3 hrs.
ET* .....3 hrs.	ET* .....3 hrs.	ET* .....3 hrs.	ET 4380 .....3 hrs.
Specialization** ...3 hrs.	Specialization** ..3 hrs.	Specialization** ...3 hrs.	ET* .....3 hrs.
ENGR 2301 .....3 hrs.	ENGR 2302 .....3 hrs.	Social/Behavioral	Specialization** ..3 hrs.
Social/Behavioral	Humanities	core .....6 hrs.	Social/Behavioral
core .....3 hrs.	core .....3 hrs.	15 hrs.	core .....3 hrs.
PHED	15 hrs.		15 hrs.
activity .....1 hr.			
16 hrs.			

*Choose from ET 3315, 3330, 4301, 4311, 4325, 4330.
**Choose from ET, MATH, CIS, MGT advanced elective by advisement.

Curriculum Guide (suggested course sequence)

Major in Engineering Technology—Option II

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	Social/Behavioral	Social/Behavioral
MATH 1324 .....3 hrs.	MATH 1325 .....3 hrs.	core .....3 hrs.	core .....3 hrs.
ENGR 1315 .....3 hrs.	ENGR 1301 .....3 hrs.	SCOM 1315 .....3 hrs.	Visual/Performing
CHEM 1411 .....4 hrs.	ENGR 1304 .....3 hrs.	ENGL 2311 .....3 hrs.	arts core .....3 hrs.
Social/Behavioral	CHEM 1412 ....4 hrs.	ET 2371 .....3 hrs.	ET 2372 .....3 hrs.
core .....3 hrs.	16 hrs.	PHYS 1401 .....4 hrs.	ET 3301 .....3 hrs.
16 hrs.		PHED	PHYS 1402
		activity .....1 hr.	w/lab .....4 hrs.
		17 hrs.	PHED 1111 ....1 hr.
			17 hrs.
Third Year		**Fourth Year**	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ET 3360 .....3 hrs.	ET 4311 .....3 hrs.	ET 4314 .....3 hrs.	ET 4370 .....3 hrs.
ET* .....3 hrs.	ET* .....3 hrs.	ET 4340 .....3 hrs.	ET 4380 .....3 hrs.
MGT/MKT** .....3 hrs.	MGT/MKT** .....3 hrs.	ET* .....3 hrs.	ET* .....3 hrs.
Humanities	Humanities	MGT/MKT** .....3 hrs.	MGT/MKT** .....3 hrs.
core .....3 hrs.	core .....3 hrs.	Elective .....3 hrs.	Social/Behavioral
Social/Behavioral	Elective .....3 hrs.	15 hrs.	core .....3 hrs.
core .....3 hrs.	15 hrs.		15 hrs.
15 hrs.			

*Choose four courses—ET 3315, 3330, 4301, 4325, 4330.
**Choose four courses—MGT 3330, 3332, 3335, 4311 or MGT 3330, MKT 3340, 3342, 4340, 4346.

Department of Mathematics, Physical Sciences and Engineering

Major in Mechanical Engineering
(Major Code: 129)

University Core Curriculum Requirements

Refer to the "University Core Curriculum" section of this catalog. Core curriculum elections for mechanical engineering majors:

- PHYS 2425, 2426 from natural sciences.
- MATH 2413 from mathematics.

Mechanical Engineering Requirements

- ENGR 1301, 1304, 1315, 2301, 2302, 3302; MENG 3340, 3360, 4304, 4360, 4380.
- CHEM 1411, CS 2315, ENGL 2311, ET 2371, MATH 2414, 3340, 3342, 4361, 4362, PHYS 3320.
- 15 hours from CHEM, CIS, CS, ENGR, ET, MATH, MENG, PHYS, at least nine hours from MENG, at least two laboratory hours, at least nine hours upper level.

Admission Requirements for Pre-Engineering and Mechanical Engineering

All mechanical engineering students must meet West Texas A&M University admission. Upon admission to the University, all WTAMU students would be eligible to engage in and complete the first two years of the engineering program. In the semester during which the student would complete the pre-engineering sequence (cited below), the student may petition for admittance into the mechanical engineering program. Every student enrolled in upperlevel mechanical engineering courses must first be admitted into the mechanical engineering program or receive special permission from the Engineering Program Coordinator.

Criteria for admission into the Mechanical Engineering Program:

- Overall GPA of at least 2.25.
- GPA in mathematics/physics/engineering courses of at least 2.75.
- Completion of the pre-engineering sequence—MATH 2413, 2414, PHYS 2425, 2426, ENGR 1301, 2301, 2302.
- Successfully complete the entrance interview.

Students pursuing a mechanical engineering degree who do not meet the aforementioned criteria are to be listed as pre-engineering (Major Code 128) students.

Students may appeal Admissions Committee decisions, first to the committee and then to the Engineering Program coordinator. Exceptions, resulting in conditional admission, will be considered on an individual basis by the head of the Engineering Program coordinator.

Curriculum Guide (suggested course sequence)

Major in Mechanical Engineering
Bachelor of Science Degree

First Year		Second Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
ENGR 1315 .....3 hrs.	ENGR 1301 .....3 hrs.	ENGR 2301 .....3 hrs.	ENGR 2302 .....3 hrs.
ENGR 1304 .....3 hrs.	MATH 2414 .....4 hrs.	MATH 3342 .....3 hrs.	MATH 3340 .....3 hrs.
MATH 2413 .....4 hrs.	PHYS 2425 .....4 hrs.	PHYS 2426 .....4 hrs.	ENGL 2311 .....3 hrs.
ENGL 1301 .....3 hrs.	ENGL 1302 .....3 hrs.	ET 2371 .....3 hrs.	CHEM 1411 .....4 hrs.
POSC 2305.....3 hrs.	POSC 2306 ...3 hrs.	HIST 1301 .....3 hrs.	HIST 1302 .....3 hrs.
PHED 1111 .... 1 hr.	17 hrs.	PHED activity ..... 1 hr.	16 hrs.
17 hrs.		17 hrs.	

Third Year		Fourth Year	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
MENG 3360 .....3 hrs.	ENGR 3302 ....3 hrs.	MENG 4304 .....3 hrs.	MENG 4380 .....3 hrs.
MENG elective .....3 hrs.	MENG 3340 ....3 hrs.	MATH 4362 .....3 hrs.	MENG elective .....3 hrs.
PHYS 3320 .....3 hrs.	MENG 4360 ....3 hrs.	Elective** .....3 hrs.	Elective** .....3 hrs.
CS 2315 .....3 hrs.	MATH 4361 .....3 hrs.	Elective** .....3 hrs.	Humanities core .....3 hrs.
SCOM 1315 ... 3 hrs.	Humanities core ..... 3 hrs.	Visual/Performing arts core ..... 3 hrs.	Social/Behavioral core ..... 3 hrs.
15 hrs.	15 hrs.	15 hrs.	15 hrs.

**Choose from CHEM, CIS, CS, ENGR, ESC, ET, MATH, MENG or PHYS. Must include at least two laboratory hours. Must include at least three hours from MENG.