# **Physics - Undergraduate Programs**

Academic Advising: 107 Life Science Building • 817.272.9685

### **Degree Programs**

The Department of Physics offers five Bachelor of Science degree programs, a Bachelor of Arts degree program, and a Bachelor of Science in Physics/Master's in Materials Science and Engineering Fast Track Program.

The Bachelor of Science degree programs include one which prepares students for careers in science and technology, another for medical school preparation, and a third for students wanting to minor in an Engineering discipline. When combined with the required UTeach education courses, the Bachelor of Science program is also appropriate for students who are interested in becoming schoolteachers.\* The Bachelor of Arts degree in Physics is intended for students who seek a broader education while retaining a firm foundation in Physics. The Bachelor of Science degree in Physics/Master's degree in Materials Science and Engineering Fast Track Program enables outstanding senior undergraduate students in Physics to satisfy degree requirements leading to a Bachelor's degree in Physics while simultaneously pursuing a Master's degree in Materials Science and Engineering.

Students considering a Physics major should schedule an appointment with the undergraduate advisor in Physics to discuss their degree and career options. Physics majors are encouraged to participate in research projects under faculty guidance for course credit or financial reward. In this way, undergraduate students have the choice of gaining hands-on experience from a variety of research disciplines, including astrophysics, biophysics, computational physics, high energy physics, medical physics, optics, space physics, and theoretical and experimental condensed matter physics.

The faculty of the Physics Department encourages qualified students to participate in the university's Honors College. Scholarships may be offered every year to new students majoring in Physics.

\* Students desiring certification for teaching at the secondary level must fulfill specific requirements for the appropriate Physics B.S. Teacher Certification degree.

### **Second Major in Physics**

Students who satisfy the requirements for any other baccalaureate degree qualify to have Physics named as a second major upon completion of the following courses:

Total Hours		37
PHYS electives approve	ed by Physics undergraduate advisor and/or Chair of the Department of Physics	17
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4

### **Teacher Certification**

Students who are interested in earning a Bachelor of Science degree in Physics with Secondary Teacher Certification should refer to the Bachelor of Science in Physics with Physical Science Teacher Certification and the Bachelor of Science in Physics with Physics/Mathematics Teacher Certification degree plans for requirements. Teacher certification is offered through the UTeach program.

### Requirements for a Bachelor of Science in Physics

This program provides students with a rigorous training in Physics, which is designed to prepare for a career in science, technology, and/or engineering research.

The University Core Curriculum consists of 42 credit hours from <u>University Core Curriculum</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>).

RECOMMENDED CORE REQUIRE	MENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3

POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Culture		3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 2321	WORLD HISTORY TO 1400	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component Area *		3
PROGRAM REQUIREMENTS		
Communication Competence - satisf	ied by PHYS 4117	
	ed by Computer Science requirement for major	
PROFESSIONAL COURSES	,	
Select one of the following for Comp	uter Science requirement:	
DATA 3401	PYTHON FOR DATA SCIENCE 1	4
or higher-numbered CSE course		
PHYS 2321	COMPUTATIONAL PHYSICS	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
	by Physics undergraduate advisor and/or Chair of the Department of Physics	
CHEM 1441	GENERAL CHEMISTRY I	4
CHEM 1442	GENERAL CHEMISTRY II	4
	partments of Biology and/or Earth and Environmental Sciences	6
MATH 2326	CALCULUS III	3
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
or MATH 3318	DIFFERENTIAL EQUATIONS	
MATH 4000-level elective		3
	minor by consulting with the undergraduate advisor for the Department of Mathematics to discuss additional	
requirements.	,	
MAJOR		
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4319	ADVANCED MECHANICS	3
PHYS 4324	ADVANCED ELECTRICITY AND MAGNETISM	3
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS electives approved by Physics	s undergraduate advisor and/or Chair of the Department of Physics	14
General Electives		10
36 hours of coursework must be adv	ranced (3000/4000-level) to earn degree.	
Total Hours		123

See <u>General Core Requirements</u> (<a href="http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/">http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</a>) for approved courses.

### **TYPICAL COURSE SEQUENCE**

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS I, in the first semester.

First Year				
First Semester	Hours	Second Semester	Hours	
PHYS 1443		4 PHYS 1444		4
MATH 1426		4 ENGL 1302		3
ENGL 1301		3 MATH 2425		4
HIST 1301		3 HIST 1302		3
		14		14
Second Year				
First Semester	Hours	Second Semester	Hours	
PHYS 3313		3 PHYS 2311		3
MATH 2326		3 PHYS 3183		1
MATH 3319 or 3318		3 BIOL or GEOL course for majors		3
Creative Arts*		3 Social/Behavioral Science	e*	3
CHEM 1441		4 CHEM 1442		4
		16		14
Third Year				
First Semester	Hours	Second Semester	Hours	
PHYS 3321		3 PHYS 4324		3
approved PHYS elective		4 approved PHYS elective		4
Data Science Course (DATA 3401 or CSE 1311 or higher-numbered CSE co	ourse, PHYS 2321, or MATH 3345)	4 MATH 4000-level elective	•	3
POLS 2311		3 POLS 2312		3
General Elective		3 Language, Philosophy an Culture*	d	3
		17		16
Fourth Year				
First Semester	Hours	Second Semester	Hours	
PHYS 4315		3 PHYS 4117		1
PHYS 4326		3 PHYS 4319		3
approved PHYS course		3 approved PHYS elective		3
BIOL or GEOL course for majors		3 Foundational Component Area <sup>*</sup>		3
General Elective		3 General Electives		4
		15		14

Total Hours: 120

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## Requirements for a Bachelor of Science in Physics with Engineering Emphasis

This program allows students to augment a rigorous training in Physics with the choice of a minor in a suitable engineering discipline, thus combining a theoretical understanding of the basic physical theories with a practical, more detailed understanding given in the College of Engineering. Such a combination would be a bonus for employment in the engineering-type professions often chosen by Physics majors.

The University Core Curriculum consists of 42 credit hours from <u>University Core Curriculum</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>).

RECOMMENDED CORE REQUIRE	MENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Culture *		3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3

<sup>\*</sup> See <u>General Core Requirements</u> (<a href="http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/">http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</a>) for approved courses.

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Total Hours		120
36 hours of coursework mu	st be advanced (3000/4000-level) to earn degree.	
General Electives		6
PHYS electives approved b	by Physics undergraduate advisor and/or Chair of the Department of Physics	12
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS 4324	ADVANCED ELECTRICITY AND MAGNETISM	3
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
MAJOR		
ENGINEERING MINOR: 18	3 or more hours as required by the appropriate Engineering department	18
or MATH 3318	DIFFERENTIAL EQUATIONS	
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
MATH 2326	CALCULUS III	3
course for majors in the dep	partments of Biology, Chemistry and Biochemistry, or Earth and Environmental Sciences	4
CHEM 1441	GENERAL CHEMISTRY I	4
or other suitable course	approved by Physics undergraduate advisor and/or Chair of the Department of Physics	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
PHYS 2321	COMPUTATIONAL PHYSICS	
or higher-numbered CSE	E course	
DATA 3401	PYTHON FOR DATA SCIENCE 1	4
	for Computer Science requirement:	
PROFESSIONAL COURSE		
·	e - satisfied by Computer Science requirement for major	
	ce - satisfied by PHYS 4117	
Foundational Component A PROGRAM REQUIREMEN		3
	*	3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865 HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	2

<sup>\*</sup> See General Core Requirements (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

### **TYPICAL COURSE SEQUENCE**

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor as well as the undergraduate advisor in the appropriate Engineering department. Many courses in Physics are not offered every semester, and Engineering coursework and sequences are determined by individual departments in the College of Engineering. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS I, in the first semester.

First Year				
First Semester	Hours	Second Semester	Hours	
PHYS 1443		4 PHYS 1444		4
MATH 1426		4 ENGL 1302		3
ENGL 1301		3 MATH 2425		4
HIST 1301		3 HIST 1302		3
		14		14
Second Year				
First Semester	Hours	Second Semester	Hours	
PHYS 3313		3 PHYS 2311		3
MATH 2326		3 PHYS 3183		1
MATH 3319 or 3318		3 Engineering minor course	e**	3
Engineering minor course**		3 BIOL, CHEM, or GEOL course for majors		4

CHEM 1441		4 Creative Arts*		3
		16		14
Third Year				
First Semester	Hours	Second Semester	Hours	
PHYS 3321		3 PHYS 4324		3
approved PHYS elective		4 approved PHYS elective		4
Engineering minor course**		3 Engineering minor course**		3
Data Science Course (DATA 3401 or CSE 1311 or higher-numbered CSE cou	rse, PHYS 2321, or MATH 3345)	3-4 POLS 2312		3
POLS 2311		3 Social/Behavioral Science*		3
		16-17		16
Fourth Year				
First Semester	Hours	Second Semester	Hours	
PHYS 4315		3 PHYS 4117		1
PHYS 4326		3 approved PHYS elective		4
Engineering minor course**		3 Engineering minor course**		3
Language, Philosophy and Culture *		3 Foundational Component Area*		3
General Elective		3 General Elective(s)		3-4
		15		14-15

Total Hours: 119-121

- \* See <u>General Core Requirements</u> (<a href="http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/">http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</a>) for approved courses.
- \*\* Actual number of courses/hours and course sequence determined by appropriate Engineering department.

### Requirements for a Bachelor of Science in Physics with Medical School Preparation

This program offers the broad background in fundamental science and strong problem-solving ability of a Physics degree as well as specific Biology and Chemistry medical school requirements. The combination of skills developed in this program is designed to provide the intellectual foundation necessary for excellence in research and the practice of medicine.

The University Core Curriculum consists of 42 credit hours from <u>University Core Curriculum</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>).

RECOMMENDED CORE REQUIRE	MENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Culture *		3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component Area *		3
PROGRAM REQUIREMENTS		
Communication Competence - satisf	ied by PHYS 4117	
Computer Use Competence - satisfie	ed by Computer Science requirement for major	
PROFESSIONAL COURSES		
Select one of the following for Comp	uter Science requirement:	3
DATA 3401	PYTHON FOR DATA SCIENCE 1	4
or higher-numbered CSE course		
PHYS 2321	COMPUTATIONAL PHYSICS	

MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
or other suitable course approved	d by Physics undergraduate advisor and/or Chair of the Department of Physics	
CHEM 1441	GENERAL CHEMISTRY I	4
CHEM 1442	GENERAL CHEMISTRY II	4
CHEM 2321	ORGANIC CHEMISTRY I	3
CHEM 2181	ORGANIC CHEMISTRY I LABORATORY	1
CHEM 2322	ORGANIC CHEMISTRY II	3
CHEM 2182	ORGANIC CHEMISTRY II LABORATORY	1
MATH 2326	CALCULUS III	3
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
or MATH 3318	DIFFERENTIAL EQUATIONS	
BIOLOGY MINOR		
BIOL 1441	BIOLOGY I FOR SCIENCE MAJORS: CELL AND MOLECULAR BIOLOGY	4
BIOL 1442	BIOLOGY II FOR SCIENCE MAJORS: ECOLOGY AND EVOLUTION	4
BIOL electives to give the total of 18	B hours, 6 hours of which must be advanced (3000/4000-level)	10
MAJOR		
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
or PHYS 4319	ADVANCED MECHANICS	
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS electives approved by Physic	s undergraduate advisor and/or Chair of the Department of Physics	11
General Electives		3
36 hours of coursework must be adv	vanced (3000/4000-level) to earn degree.	
Total Hours		124

<sup>\*</sup> See General Core Requirements (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

### **TYPICAL COURSE SEQUENCE**

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. Consultation with the Health Professions advisor is also encouraged. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS I, in the first semester.

First Year				
First Semester	Hours	Second Semester	Hours	
PHYS 1443		4 PHYS 1444		4
MATH 1426		4 MATH 2425		4
CHEM 1441		4 CHEM 1442		4
ENGL 1301		3 ENGL 1302		3
		15		15
Second Year				
First Semester	Hours	Second Semester	Hours	
MATH 2326		3 PHYS 2311		3
MATH 3319 or 3318		3 BIOL 1441		4
CHEM 2321		3 CHEM 2322		3
CHEM 2181		1 CHEM 2182		1
HIST 1301		3 HIST 1302		3
		13		14
Third Year				
First Semester	Hours	Second Semester	Hours	
PHYS 3313		3 approved PHYS elective		4
PHYS 3183		1 approved PHYS elective		3
PHYS 3321		3 BIOL minor course**		3

BIOL 1442	4 Data Science Course 3401 or CSE 1311 o numbered CSE cour PHYS 2321, or MAT	higher- se,	3-4
BIOL minor course**	3 Social/Behavioral So	ience <sup>*</sup>	3
	14		16-17
Fourth Year			
First Semester	Hours Second Semester	Hours	
PHYS 4315	3 PHYS 4117		1
PHYS 4326	3 approved PHYS elec	tive	4
BIOL minor course**	4 POLS 2312		3
POLS 2311	3 Creative Arts*		3
Language, Philosophy and Culture <sup>*</sup>	3 Foundational Compo Area	nent	3
	General Elective		2-3
	16		16-17

Total Hours: 119-121

### Requirements for a Bachelor of Arts in Physics

This program is intended for students who seek a broader education while retaining a firm foundation in Physics.

The University Core Curriculum consists of 42 credit hours from <u>University Core Curriculum</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>).

RECOMMENDED CORE REQUI	IREMENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Cultur	re <sup>*</sup>	3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component Area *		3
PROGRAM REQUIREMENTS		
Communication Competence - sa	atisfied by PHYS 4117	
Computer Use Competence - sat	tisfied by Computer Science requirement for major	
PROFESSIONAL COURSES		
Select one of the following for Co	omputer Science requirement:	3
CSE 1311	INTRODUCTION TO PROGRAMMING FOR ENGINEERS	3
or higher-numbered CSE cour	se	
PHYS 2321	COMPUTATIONAL PHYSICS	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
or other suitable course appro-	ved by Physics undergraduate advisor and/or Chair of the Department of Physics	
courses for majors in the departm	nents of Biology, Chemistry and Biochemistry, and/or Earth and Environmental Sciences	8

<sup>\*</sup> See <u>General Core Requirements</u> (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

<sup>\*\*</sup> Coursework for Biology minor should be chosen in consultation with a Biology undergraduate advisor.

Total Hours		123
36 hours of coursework must	be advanced (3000/4000-level) to earn degree.	
General Electives		7
PHYS electives approved by	Physics undergraduate advisor and/or Chair of the Department of Physics	11
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
MAJOR		
MINOR: 18 or more hours as	required by the appropriate department	18
Modern and Classical Langua	ages	4
or MATH 3318	DIFFERENTIAL EQUATIONS	
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
MATH 2326	CALCULUS III	3

<sup>\*</sup> See <u>General Core Requirements</u> (<a href="http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/">http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</a>) for approved courses.

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS ICALCULUS I, in the first semester.

First Year			
First Semester	Hours	Second Semester Ho	ours
MATH 1426	riours	4 PHYS 1443	4
BIOL, CHEM, or GEOL course for majors		4 MATH 2425	4
ENGL 1301		3 ENGL 1302	3
HIST 1301		3 HIST 1302	3
		14	14
Second Year		17	
First Semester	Hours	Second Semester Ho	ours
PHYS 1444		4 PHYS 2311	3
MATH 2326		3 PHYS 3313	3
MATH 3319 or 3318		3 PHYS 3183	1
minor course		3 BIOL, CHEM, or GEOL course for majors	4
Creative Arts		3 minor course	3
		16	14
Third Year			
Time Tour			
First Semester	Hours	Second Semester Ho	ours
	Hours	Second Semester Ho 3 approved PHYS elective	ours 4
First Semester PHYS 3321 approved PHYS elective	Hours		
First Semester PHYS 3321	Hours	3 approved PHYS elective	4
First Semester PHYS 3321 approved PHYS elective	Hours	3 approved PHYS elective 4 minor course  3 Computer Science course (CSE 1311 or higher- numbered CSE course,	4
First Semester PHYS 3321 approved PHYS elective minor course	Hours	3 approved PHYS elective 4 minor course  3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345)	4 3 3
First Semester PHYS 3321 approved PHYS elective minor course  Modern/Classical Language	Hours	3 approved PHYS elective 4 minor course 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312	4 3 3 3
First Semester PHYS 3321 approved PHYS elective minor course  Modern/Classical Language	Hours	3 approved PHYS elective 4 minor course** 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312 3 Social/Behavioral Science*	4 3 3 3 3
First Semester PHYS 3321 approved PHYS elective minor course**  Modern/Classical Language POLS 2311	Hours	3 approved PHYS elective 4 minor course** 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312 3 Social/Behavioral Science*	4 3 3 3 3
First Semester PHYS 3321 approved PHYS elective minor course**  Modern/Classical Language POLS 2311  Fourth Year		3 approved PHYS elective 4 minor course** 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312 3 Social/Behavioral Science*	3 3 3 3 16
First Semester PHYS 3321 approved PHYS elective minor course**  Modern/Classical Language POLS 2311  Fourth Year First Semester PHYS 4315 PHYS 4326		3 approved PHYS elective 4 minor course** 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312 3 Social/Behavioral Science*  17  Second Semester Ho 3 PHYS 4117 3 approved PHYS elective	4 3 3 3 3 16
First Semester PHYS 3321 approved PHYS elective minor course*  Modern/Classical Language POLS 2311  Fourth Year First Semester PHYS 4315		3 approved PHYS elective 4 minor course** 3 Computer Science course (CSE 1311 or higher- numbered CSE course, PHYS 2321, or MATH 3345) 4 POLS 2312 3 Social/Behavioral Science*  17  Second Semester Ho 3 PHYS 4117	4 3 3 3 3 16 Durs

General Elective	3 General Elective(s)	4

Total Hours: 120

- \* See <u>General Core Requirements</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>) for approved courses.
- \*\* Actual number of courses/hours and course sequence determined by appropriate department.

FRE-FROFESSIONAL CO	OUNSES	
RECOMMENDED CORE F	REQUIREMENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and	Culture *	3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science	*	3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component A	Area *	3
PROGRAM REQUIREMEN	NTS	
Communication Competen	ce - satisfied by PHYS 4117	
Computer Use Competence	e - satisfied by Computer Science requirement for major	
PROFESSIONAL COURS	ES	
Select one of the following	for Computer Science requirement:	3
CSE 1311	INTRODUCTION TO PROGRAMMING FOR ENGINEERS	3
or higher-numbered CSI	E course	
PHYS 2321	COMPUTATIONAL PHYSICS	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
or other suitable course	approved by UTeach advisor and/or Chair of the Department of Physics	
MATH 2326	CALCULUS III	3
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
CHEMISTRY MINOR		
CHEM 1441	GENERAL CHEMISTRY I	4
CHEM 1442	GENERAL CHEMISTRY II	4
CHEM 2335	QUANTITATIVE CHEMISTRY	3
CHEM 2285	QUANTITATIVE CHEMISTRY LABORATORY	2
CHEM 3315	INTRODUCTION TO BIOPHYSICAL CHEMISTRY	3
CHEM 3321	PHYSICAL CHEMISTRY I	3
CHEM 3181	PHYSICAL CHEMISTRY I LABORATORY	1
TEACHER CERTIFICATIO	N REQUIREMENTS (UTEACH)	
SCIE 1201	STEP 1: INQUIRY APPROACHES TO TEACHING	2
SCIE 1202	STEP 2: INQUIRY-BASED LESSON DESIGN	2
SCIE 4107	CAPSTONE TEACHING EXPERIENCE SEMINAR	1
SCIE 4607	CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES	6
EDUC 4331	KNOWING AND LEARNING IN MATH AND SCIENCE	3
EDUC 4332	CLASSROOM INTERACTIONS	3
EDUC 4333	MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE	3
PHIL 2314	PERSPECTIVES ON SCIENCE AND MATHEMATICS	3

MAJOR		
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4319	ADVANCED MECHANICS	3
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS 4391	SPECIAL TOPICS (Research Methods)	3
PHYS electives approved by UTeach	h advisor and/or Chair of the Department of Physics	6
36 hours of coursework must be adv	ranced (3000/4000-level) to earn degree.	
Total Hours		130

<sup>\*</sup> See General Core Requirements (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS ICALCULUS I, in the first semester.

First Year				
First Semester	Hours	Second Semester	Hours	
MATH 1426		4 PHYS 1443		4
CHEM 1441		4 MATH 2425		4
ENGL 1301		3 ENGL 1302		3
HIST 1301		3 HIST 1302		3
SCIE 1201		2 SCIE 1202		2
		16		16
Second Year				
First Semester	Hours	Second Semester	Hours	
PHYS 1444		4 PHYS 2311		3
MATH 2326		3 PHYS 3313		3
MATH 3319		3 PHYS 3183		1
CHEM 1442		4 CHEM 2335		3
EDUC 4331		3 CHEM 2285		2
		EDUC 4332		3
		17		15
Third Year				
First Semester	Hours	Second Semester	Hours	
First Semester PHYS 3321	Hours	Second Semester 3 PHYS 4391 (Research Methods)	Hours	3
	Hours	3 PHYS 4391 (Research	Hours	3
PHYS 3321	Hours	3 PHYS 4391 (Research Methods)	Hours	
PHYS 3321  CHEM 3315	Hours	3 PHYS 4391 (Research Methods) 3 approved PHYS elective	Hours	3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)	Hours	3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312	Hours	3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311	Hours	3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts	Hours	3 3 3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311	Hours	3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science	Hours	3 3 3 3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314	Hours	3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science	Hours	3 3 3 3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science		3 3 3 3
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year  First Semester		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science		3 3 3 3 15
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year  First Semester  PHYS 4315		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science 15  Second Semester 3 PHYS 4117		3 3 3 3 15
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year  First Semester  PHYS 4315  PHYS 4326		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science 15  Second Semester 3 PHYS 4117 3 PHYS 4319 3 Language, Philosophy and		3 3 3 3 15
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year  First Semester  PHYS 4315  PHYS 4326  approved PHYS elective		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science 15  Second Semester 3 PHYS 4117 3 PHYS 4319 3 Language, Philosophy and Culture 3 Foundational Component		3 3 3 3 15
PHYS 3321  CHEM 3315  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  POLS 2311  PHIL 2314  Fourth Year  First Semester  PHYS 4315  PHYS 4326  approved PHYS elective  CHEM 3321		3 PHYS 4391 (Research Methods) 3 approved PHYS elective 3 POLS 2312 3 Creative Arts 3 Social/Behavioral Science 15  Second Semester 3 PHYS 4117 3 PHYS 4319 3 Language, Philosophy and Culture 3 Foundational Component Area		3 3 3 3 15

Total Hours: 127

 $^* \quad \text{See } \underline{\text{General Core Requirements}} \ (\underline{\text{http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/}}) \ for \ approved \ courses.$ 

RECOMMENDED CORE REQUIRE	MENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Culture		3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component Area *		3
PROGRAM REQUIREMENTS		
Communication Competence - satis	fied by PHYS 4117	
Computer Use Competence - satisfi	ed by Computer Science requirement for major	
PROFESSIONAL COURSES		
Select one of the following for Comp	outer Science requirement:	3
CSE 1311	INTRODUCTION TO PROGRAMMING FOR ENGINEERS	3
or higher-numbered CSE course		
PHYS 2321	COMPUTATIONAL PHYSICS	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
or other suitable course approve	d by UTeach advisor and/or Chair of the Department of Physics	
CHEM 1441	GENERAL CHEMISTRY I	4
CHEM 1441 CHEM 1442	GENERAL CHEMISTRY II	4
CHEM 1442		
CHEM 1442 MATHEMATICS MINOR	GENERAL CHEMISTRY II	4
CHEM 1442 MATHEMATICS MINOR MATH 2326	GENERAL CHEMISTRY II  CALCULUS III	3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330	GENERAL CHEMISTRY II  CALCULUS III  FUNCTIONS AND MODELING	3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300	GENERAL CHEMISTRY II  CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS	3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301	GENERAL CHEMISTRY II  CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS  FOUNDATIONS OF GEOMETRY	3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS  FOUNDATIONS OF GEOMETRY  DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA  ABSTRACT ALGEBRA I	3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING	3 3 3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS  FOUNDATIONS OF GEOMETRY  DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA  ABSTRACT ALGEBRA I  IIREMENTS (UTEACH)  STEP 1: INQUIRY APPROACHES TO TEACHING  STEP 2: INQUIRY-BASED LESSON DESIGN	3 3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR	4 3 3 3 3 3 3 2 2 2
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES	4 3 3 3 3 3 3 3 2 2 2 1 6
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE	4 3 3 3 3 3 3 2 2 2 1 6 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS	4 3 3 3 3 3 3 2 2 1 6 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE	4 3 3 3 3 3 3 2 2 1 6 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333 PHIL 2314	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS	4 3 3 3 3 3 3 2 2 1 6 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333 PHIL 2314 MAJOR	CALCULUS III  FUNCTIONS AND MODELING INTRODUCTION TO PROOFS  FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE PERSPECTIVES ON SCIENCE AND MATHEMATICS	4 3 3 3 3 3 3 2 2 1 6 3 3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333 PHIL 2314 MAJOR PHYS 2311	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE PERSPECTIVES ON SCIENCE AND MATHEMATICS	4 3 3 3 3 3 3 2 2 1 6 3 3 3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333 PHIL 2314 MAJOR PHYS 2311 PHYS 3313	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE PERSPECTIVES ON SCIENCE AND MATHEMATICS  MATHEMATICAL METHODS OF PHYSICS INTRODUCTION TO MODERN PHYSICS	4 3 3 3 3 3 3 2 2 1 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
CHEM 1442 MATHEMATICS MINOR MATH 2326 MATH 2330 MATH 3300 MATH 3301 MATH 3319 MATH 3321 TEACHER CERTIFICATION REQU SCIE 1201 SCIE 1202 SCIE 4107 SCIE 4607 EDUC 4331 EDUC 4332 EDUC 4333 PHIL 2314 MAJOR PHYS 2311	CALCULUS III FUNCTIONS AND MODELING INTRODUCTION TO PROOFS FOUNDATIONS OF GEOMETRY DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA ABSTRACT ALGEBRA I IIREMENTS (UTEACH) STEP 1: INQUIRY APPROACHES TO TEACHING STEP 2: INQUIRY-BASED LESSON DESIGN CAPSTONE TEACHING EXPERIENCE SEMINAR CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES KNOWING AND LEARNING IN MATH AND SCIENCE CLASSROOM INTERACTIONS MULTIPLE TEACHING PRACTICES IN MATH AND SCIENCE PERSPECTIVES ON SCIENCE AND MATHEMATICS	4 3 3 3 3 3 3 2 2 1 6 3 3 3 3 3 3 3

Total Hours		130
36 hours of coursework must	be advanced (3000/4000-level) to earn degree.	
PHYS electives approved by	UTeach advisor and/or Chair of the Department of Physics	6
PHYS 4391	SPECIAL TOPICS (Research Methods)	3
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS 4319	ADVANCED MECHANICS	3
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1

<sup>\*</sup> See General Core Requirements (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS ICALCULUS I, in the first semester.

CHEM 1441 ENGL 1301 SIGE 1201 20 Second Year First Semester Hours PHYS 1444 MATH 2326 MATH 3319 CHEM 1442 EDUC 4331  Third Year First Semester Hours  Hours  17 Third Year First Semester Hours  18 Third Year First Semester Hours  19 Third Year First Semester Hours	Second Semester PHYS 1443 MATH 2425 ENGL 1302 HIST 1302 SCIE 1202  Second Semester PHYS 2311 PHYS 3313 PHYS 3183 MATH 3300	Hours	4 4 3 3 2 16
CHEM 1441	MATH 2425 ENGL 1302 HIST 1302 SCIE 1202  Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	4 3 2 16
ENGL 1301 3 HIST 1301 3 SCIE 1201 2  Second Year	ENGL 1302 HIST 1302 SCIE 1202 Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	3 2 16
HIST 1301 SCIE 1201  Second Year  First Semester Hours  PHYS 1444  MATH 2326  MATH 3319  CHEM 1442  EDUC 4331  Third Year  First Semester Hours  Hours  17  Third Year  First Semester Hours  Approved PHYS elective MATH 2330  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345) PHIL 2314  Fourth Year  First Semester Hours  15  Fourth Year  First Semester Hours  15  Fourth Year  First Semester Hours  15  Fourth Year  First Semester Hours	HIST 1302 SCIE 1202 Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	3 2 16
SCIE 1201       2         Second Year         First Semester       Hours         PHYS 1444       4         MATH 2326       3         MATH 3319       3         CHEM 1442       4         EDUC 4331       17         Third Year         First Semester       Hours         PHYS 3321       3         approved PHYS elective       3         MATH 2330       3         Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)       3         PHIL 2314       3         Fourth Year         First Semester       Hours         PHYS 4315       3         PHYS 4326       3	SCIE 1202  Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	2 16
Second Year   First Semester   Hours	Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	<b>16</b>
Second Year         First Semester         Hours           PHYS 1444         4           MATH 2326         3           MATH 3319         3           CHEM 1442         4           EDUC 4331         3           Trird Year           First Semester         Hours           PHYS 3321         3           approved PHYS elective         3           MATH 2330         3           Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)         3           PHIL 2314         3           Fourth Year           First Semester         Hours           PHYS 4315         3           PHYS 4326         3	Second Semester PHYS 2311 PHYS 3313 PHYS 3183	Hours	3
First Semester         Hours           PHYS 1444         4           MATH 2326         3           MATH 3319         3           CHEM 1442         4           EDUC 4331         3           Third Year           First Semester         Hours           PHYS 3321         3           approved PHYS elective         3           MATH 2330         3           Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)         3           PHIL 2314         3           Fourth Year           First Semester         Hours           PHYS 4315         3           PHYS 4326         3	PHYS 2311 PHYS 3313 PHYS 3183	Hours	
PHYS 1444       4         MATH 2326       3         MATH 3319       3         CHEM 1442       4         EDUC 4331       3         Third Year         First Semester       Hours         PHYS 3321       3         approved PHYS elective       3         MATH 2330       3         Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)       3         PHIL 2314       3         Fourth Year         First Semester       Hours         PHYS 4315       3         PHYS 4326       3	PHYS 2311 PHYS 3313 PHYS 3183	Hours	
MATH 2326  MATH 3319  CHEM 1442  EDUC 4331  Third Year  First Semester  Hours  Hours  Approved PHYS elective  MATH 2330  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  PHIL 2314  Tourth Year  First Semester  Hours  15  Fourth Year  First Semester  Hours  Hours	PHYS 3313 PHYS 3183		
MATH 3319 CHEM 1442 EDUC 4331  Third Year First Semester Hours  Approved PHYS elective  MATH 2330  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345) PHIL 2314  Fourth Year First Semester Hours  Fourth Year First Semester	PHYS 3183		
CHEM 1442       4         EDUC 4331       3         Third Year         First Semester       Hours         PHYS 3321       3         approved PHYS elective       3         MATH 2330       3         Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)       3         PHIL 2314       3         Fourth Year         First Semester       Hours         PHYS 4315       3         PHYS 4326       3			3
EDUC 4331 3  Third Year First Semester Hours  PHYS 3321 3  approved PHYS elective 3  MATH 2330 3  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345) 3  PHIL 2314 3  Fourth Year First Semester Hours  PHYS 4315 3  PHYS 4326 3	MATH 3300		1
Third Year  First Semester Hours  Approved PHYS elective 3  MATH 2330 3  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  PHIL 2314 3  Fourth Year First Semester Hours  PHYS 4315 3  PHYS 4326 3			3
Third Year         First Semester         Hours           PHYS 3321         3           approved PHYS elective         3           MATH 2330         3           Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)         3           PHIL 2314         3           5         15           Fourth Year         First Semester         Hours           PHYS 4315         3           PHYS 4326         3	MATH 3301		3
Third Year         First Semester         Hours           PHYS 3321         3           approved PHYS elective         3           MATH 2330         3           Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)         3           PHIL 2314         3           Fourth Year         15           Fourth Semester         Hours           PHYS 4315         3           PHYS 4326         3	EDUC 4332		3
First Semester         Hours           PHYS 3321         3           approved PHYS elective         3           MATH 2330         3           Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)         3           PHIL 2314         3           Fourth Year         First Semester         Hours           PHYS 4315         3           PHYS 4326         3			16
PHYS 3321       3         approved PHYS elective       3         MATH 2330       3         Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)       3         PHIL 2314       3         Fourth Year         First Semester       Hours         PHYS 4315       3         PHYS 4326       3			
approved PHYS elective  MATH 2330  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  PHIL 2314  3  Fourth Year  First Semester  PHYS 4315  PHYS 4326  3  ATTEMPT A 326	Second Semester	Hours	
MATH 2330  Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)  PHIL 2314  3  Fourth Year  First Semester Hours  PHYS 4315  PHYS 4326	PHYS 4391 (Research Methods)		3
Computer Science course (CSE 1311 or higher-numbered CSE course, PHYS 2321, or MATH 3345)   3   3   3   3   3   3   3   3   3	approved PHYS elective		3
PHIL 2314       3         Fourth Year       15         First Semester       Hours         PHYS 4315       3         PHYS 4326       3	POLS 2311		3
15   Fourth Year   First Semester   Hours     3   3   3   3   3   3   3   3   3	Creative Arts*		3
Fourth Year         Hours           First Semester         Hours           PHYS 4315         3           PHYS 4326         3			3
First Semester         Hours           PHYS 4315         3           PHYS 4326         3	Social/Behavioral Science		
PHYS 4315 PHYS 4326 3			15
PHYS 4326			15
		Hours	15
		Hours	15
MATH 3321 3	Second Semester	Hours	
POLS 2312 3	Second Semester PHYS 4117	Hours	1
EDUC 4333	Second Semester PHYS 4117 PHYS 4319 Language, Philosophy and	Hours	1
	Second Semester PHYS 4117 PHYS 4319 Language, Philosophy and Culture* Foundational Component	Hours	1 3 3
15	Second Semester PHYS 4117 PHYS 4319 Language, Philosophy and Culture Foundational Component Area	Hours	1 3 3

Total Hours: 127

#### FOUNDATION COURSES – Required for Admission into the Fast Track Program

<sup>\*</sup> See <u>General Core Requirements</u> (<u>http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</u>) for approved courses.

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PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
11110 0021	INTERMEDIATE ELECTRICITY AND MACHENION	J
PRE-PROFESSIONAL COURS	ES Control of the con	
RECOMMENDED CORE REQU	UIREMENTS	
ENGL 1301	RHETORIC AND COMPOSITION I	3
ENGL 1302	RHETORIC AND COMPOSITION II	3
Creative Arts *		3
POLS 2311	GOVERNMENT OF THE UNITED STATES	3
POLS 2312	STATE AND LOCAL GOVERNMENT	3
Language, Philosophy and Cultu	ıre <sup>*</sup>	3
PHYS 1443	GENERAL TECHNICAL PHYSICS I	4
PHYS 1444	GENERAL TECHNICAL PHYSICS II	4
MATH 1426	CALCULUS I	4
MATH 2425	CALCULUS II	4
Social/Behavioral Science *		3
HIST 1301	HISTORY OF THE UNITED STATES TO 1865	3
HIST 1302	HISTORY OF THE UNITED STATES, 1865 TO PRESENT	3
Foundational Component Area *		3
PROGRAM REQUIREMENTS		
Communication Competence - s	atisfied by PHYS 4117	
Computer Use Competence - sa	tisfied by Computer Science requirement for major	
PROFESSIONAL COURSES		
Select one of the following for Co	omputer Science requirement:	3
CSE 1311	INTRODUCTION TO PROGRAMMING FOR ENGINEERS	3
or higher-numbered CSE cou	rse	
PHYS 2321	COMPUTATIONAL PHYSICS	
MATH 3345	NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS	
or other suitable course appro	oved by Physics undergraduate advisor and/or Chair of the Department of Physics	
CHEM 1441	GENERAL CHEMISTRY I	4
CHEM 1442	GENERAL CHEMISTRY II	4
course for majors offered in the	departments of Biology, Chemistry and Biochemistry, or Earth and Environmental Sciences	4
MATH 2326	CALCULUS III	3
MATH 3319	DIFFERENTIAL EQUATIONS & LINEAR ALGEBRA	3
or MATH 3318	DIFFERENTIAL EQUATIONS	
MSE 3300	INTRODUCTION TO MATERIALS SCIENCE AND ENGINEERING	3
MSE graduate or advanced (300	00/4000-level) courses approved by MSE graduate advisor	9
MAJOR		
PHYS 2311	MATHEMATICAL METHODS OF PHYSICS	3
PHYS 3313	INTRODUCTION TO MODERN PHYSICS	3
PHYS 3183	MODERN PHYSICS LABORATORY	1
PHYS 3321	INTERMEDIATE ELECTRICITY AND MAGNETISM	3
PHYS 3445	OPTICS	4
PHYS 4117	INDIVIDUAL LEARNING BY SEMINAR	1
PHYS 4315	THERMODYNAMICS AND STATISTICAL MECHANICS	3
PHYS 4326	INTRODUCTION TO QUANTUM MECHANICS	3
PHYS electives approved by Phy	ysics undergraduate advisor and/or Chair of the Department of Physics	12
General Electives		8
36 hours of coursework must be coursework).	advanced (3000/4000-level) to earn degree; up to 9 hours can be graduate-level (only for approved MSE	
Tatalillanna		400

**Total Hours** 

\* See General Core Requirements (http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/) for approved courses.

Details of a personal course sequence should be made with the guidance of the Physics undergraduate advisor, particularly since many courses in Physics are not offered every semester. For all entering freshmen, it is important to begin the mathematics sequence, starting with MATH 1426 CALCULUS ICALCULUS I, in the first semester.

Hours	Second Semester	Hours	
	4 PHYS 1443		4
	4 MATH 2425		4
	3 CHEM 1442		4
	3 ENGL 1302		3
	14		15
Hours	Second Semester	Hours	
	4 PHYS 2311		3
	3 PHYS 3313		3
	3 PHYS 3183		1
	3 BIOL, CHEM, or GEOL course for majors		4
	3 Language, Philosophy and Culture*		3
	16		14
Hours	Second Semester	Hours	
	3 approved PHYS elective		4
	4 approved PHYS elective		4
	0.1110T.4000		3
	3 HIST 1302		3
	3 HIST 1302 3 POLS 2312		3
	3 POLS 2312		
	3 POLS 2312 3		3
Hours	3 POLS 2312 3	Hours	3
Hours	3 POLS 2312 3 16	Hours	3
Hours	3 POLS 2312 3 16 Second Semester	Hours	14
Hours	3 POLS 2312 3 16 Second Semester 3 PHYS 4117	Hours	14 1
Hours	3 POLS 2312 3 16 Second Semester 3 PHYS 4117 3 approved PHYS elective	Hours	14 1 1 4
Hours	3 POLS 2312 3 16 Second Semester 3 PHYS 4117 3 approved PHYS elective 3 approved MSE course 3 Foundational Component	Hours	14 1 1 4 3
	Hours	4 PHYS 1443 4 MATH 2425 3 CHEM 1442 3 ENGL 1302  14  Hours  Second Semester 4 PHYS 2311 3 PHYS 3313 3 PHYS 3183 3 BIOL, CHEM, or GEOL course for majors 3 Language, Philosophy and Culture  16  Hours  Second Semester 3 approved PHYS elective 4 approved PHYS elective	4 PHYS 1443 4 MATH 2425 3 CHEM 1442 3 ENGL 1302 14  Hours  Second Semester Hours 4 PHYS 2311 3 PHYS 3313 3 PHYS 3183 3 BIOL, CHEM, or GEOL course for majors 3 Language, Philosophy and Culture 16  Hours  Second Semester Hours 3 approved PHYS elective

Total Hours: 120

- \* See <u>General Core Requirements</u> (<a href="http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/">http://catalog.uta.edu/academicregulations/degreerequirements/generalcorerequirements/</a>) for approved courses.
- \*\* Actual courses and course sequence determined by Materials Science and Engineering Department.

### **Minor in Physics**

A minimum total of 18 credit hours (including a minimum of 6 hours at the 3000/4000 level) are required. Transfer students must complete a minimum of 9 hours at UTA, 6 of which must be 3000/4000-level. A 2.0 GPA is required for coursework in the minor.

#### **REQUIRED COURSES**

PHYS electives approved by Physics undergraduate advisor and/or Chair of the Department of Physics			
PHYS 3313 INTRODUCTION TO MODERN PHYSICS	3		
PHYS 1444 GENERAL TECHNICAL PHYSICS II	4		
PHYS 1443 GENERAL TECHNICAL PHYSICS I	4		

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### Minor in Astronomy for Non-Physics Majors

A minimum total of 18 credit hours (including a minimum of 6 hours at the 3000/4000 level) are required. Transfer students must complete a minimum of 9 hours at UTA, 6 of which must be 3000/4000-level. A 2.0 GPA is required for coursework in the minor.

#### **REQUIRED COURSES**

PHYS 1441	GENERAL COLLEGE PHYSICS I	4		
PHYS 1442	GENERAL COLLEGE PHYSICS II	4		
PHYS 2315	INTRODUCTORY ASTROPHYSICS	3		
PHYS 3315	ASTROPHYSICS AND COSMOLOGY	3		
PHYS 3316	ASTROBIOLOGY I	3		
Elective Courses - choose from the following (approval from the Physics undergraduate advisor is required):				
Special Problems (PHYS 4181, PHYS 4281 - with Astronomy research faculty)				
Special Topics (PHYS 4191, PHYS 4291, PHYS 4391 - when a suitable topic is offered)				

### Minor in Astrophysics for Non-Physics Majors

A minimum total of 18 credit hours (including a minimum of 6 hours at the 3000/4000 level) are required. Transfer students must complete a minimum of 9 hours at UTA, 6 of which must be 3000/4000-level. A 2.0 GPA is required for coursework in the minor.

#### **REQUIRED COURSES**

**Total Hours** 

PHYS 1443	GENERAL TECHNICAL PHY	SICS I	4
PHYS 1444	GENERAL TECHNICAL PHY	SICS II	4
PHYS 2315	INTRODUCTORY ASTROPH	YSICS	3
PHYS 3315	ASTROPHYSICS AND COSM	OLOGY	3
Elective Courses - choose from	n the following:		4
PHYS 3313	INTRODUCTION TO MODER	N PHYSICS	
PHYS 3316	ASTROBIOLOGY I		
PHYS 3445	OPTICS		
PHYS 3446	NUCLEAR AND PARTICLE F	HYSICS	
Special Problems (PHYS 4	181, PHYS 4281 - with Astronomy res	earch faculty)	
Special Topics (PHYS 4197	, PHYS 4291, PHYS 4391 - when a s	uitable topic is offered)	
Approval from the Physics und	lergraduate advisor is required for Spe	ecial Problems and Special Topics courses	

Total Hours 18