BIOLOGY MINORS

Web Site: https://twu.edu/biology/undergraduate-programs/minors/

These are minors administered by the Biology department. The Neuroscience minor, the Scientific Illustration minor, and in some cases, the General Science minor, are appropriate for Biology majors as well as students with other majors at TWU. The Biology, Pre-Med, and Pre-PA minors are specifically designed for students with majors other than Biology.

Biology

A minor in biology requires 18 semester credit hours of Biology courses in consultation with the advisor, six of which must be advanced.

Environmental Science Minor

The Minor in Environmental Science is an interdisciplinary minor offered through the School of the Sciences. It will expose students from diverse majors to multiple scientific disciplines, including technology and communication, to enable them to incorporate an environmental perspective into their major disciplines. The minor requires 21-24 semester credit hours.

Code	Title	SCHs
ENVS 1213	Introduction to Environmental Science	3
SCI 2113	Earth Science: Global Perspectives	3
POLS 4813	Seminar in Public Policy	3
MATH 1703	Elementary Statistics I	3
Choose one of the following		3-4
BIOL 4223 & BIOL 4221	Ecology and Ecology Laboratory	
SCI 3013	Community Conversation in Sustainability	
SCI 3033	Water in a Changing Environment	
SCI 3133	Climate Change: A Human Perspective	
Choose 2 of the following		6-8
BIOL 1113 & BIOL 1111	Principles of Biology I and Principles of Biology I Laboratory	
BIOL 2113 & BIOL 2111	Plant Biology and Plant Biology Laboratory	
BIOL 4223 & BIOL 4221	Ecology and Ecology Laboratory	
BIOL 4293	Scientific Communication	
CHEM 1113 & CHEM 1111	General Chemistry I and General Chemistry Laboratory I	
CHEM 3713 & CHEM 3711	Environmental Chemistry I and Environmental Chemistry Laboratory I	
CSCI 2003	Software Systems Design and Tools	
CSCI 3373	Geographic Information Systems	
ENG 3253	Technical Writing	
MATH 1713	Elementary Statistics II	
SCI 3013	Community Conversation in Sustainability	
SCI 3033	Water in a Changing Environment	
SCI 3133	Climate Change: A Human Perspective	
Total SCHs		**21-24**

General Science

The minor in General Science requires 18 semester credit hours, six of which must be advanced. These must be divided among three of the following: chemistry, biology, physics, and science courses. If the major is biology or chemistry the hours must be divided between two of the remaining three.

Neuroscience

The minor in Neuroscience requires 20 hours and allows students to gain an appreciation for and understanding of the human brain from multiple perspectives. A maximum of two courses can be applied from major requirements. This minor is offered in collaboration with the Division of Psychology and Philosophy.

Code	Title	SCHs
BIOL 1113 & BIOL 1111	Principles of Biology I and Principles of Biology I Laboratory	4
PSY 1013	Introduction to General Psychology	3
PSY 2133	Physiological Psychology	3
ZOOL 3123 & ZOOL 3121	Neuroanatomy and Neurophysiology and Neuroanatomy and Neurophysiology Laboratory	4
Choose 6 SCH from the following		6
PSY 2513	Abnormal Psychology	
PSY 4103	Cognitive Psychology	
PSY 4313	The Changing Brain	
PSY 4423	Addiction	
ZOOL 3313	Biology of Aging	
ZOOL 4243 & ZOOL 4241	Medical Physiology and Medical Physiology Laboratory	
Total SCHs		**20**

Pre-Med

All pre-med students must take the following courses, which are required prerequisites for medical school, for success on the Medical College Admission Test (MCAT), or both. Lecture and lab must be taken concurrently; no exceptions. Students must earn a grade of "C" or higher. Fifteen of the required semester credit hours may also satisfy core requirements as applicable. Pre-medical students are strongly encouraged to contact the Pre-Health Committee at prehealth@twu.edu for pre-professional advising and support.

Code	Title	SCHs
BIOL 1113 & BIOL 1111	Principles of Biology I and Principles of Biology I Laboratory	4
BIOL 1123 & BIOL 1121	Principles of Biology II and Principles of Biology II Laboratory	4
CHEM 1113 & CHEM 1111	General Chemistry I and General Chemistry Laboratory I	4
or CHEM 1213 & CHEM 1211	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 1123 & CHEM 1121	General Chemistry II and General Chemistry Laboratory II	4
or CHEM 1223 & CHEM 1221	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 2213 & CHEM 2211	Organic Chemistry I and Organic Chemistry Laboratory I	4

CHEM 3223 & CHEM 3221	Organic Chemistry II and Organic Chemistry Laboratory II	4
CHEM 3633 & CHEM 3632	Biochemistry I and Biochemistry I Laboratory	5
MATH 1303	College Algebra	3-4
or MATH 2014	Calculus I	
MATH 1703	Elementary Statistics I	3
PHYS 1133 & PHYS 1131	Principles of Physics I and Principles of Physics Laboratory I	4
or PHYS 2153 & PHYS 2151	General Physics I and General Physics Laboratory I	
PHYS 1143 & PHYS 1141	Principles of Physics II and Principles of Physics Laboratory II	4
or PHYS 2163 & PHYS 2161	General Physics II and General Physics Laboratory II	
PSY 1013	Introduction to General Psychology	3
PSY 1603	Developmental Psychology	3
or PSY 2513	Abnormal Psychology	
SOCI 1013	Introductory Sociology	3
Choose 12 SCH from the following:		12
BACT 3113 & BACT 3111	General Microbiology and General Microbiology Laboratory	
BIOL 4813 & BIOL 4811	Molecular and Cellular Biology: Gene Expression and Molecular and Cellular Biology: Gene Expression Laboratory	
BIOL 4823 & BIOL 4821	Molecular and Cellular Biology: Genetics and Inheritance and Molecular and Cellular Biology: Genetics and Inheritance Laboratory	
BIOL 4681	Biology Seminar	
BIOL 4344	Pathophysiology	
BIOL 4983	Undergraduate Research	
BACT 4113 & BACT 4111	Immunology and Immunology Laboratory	
BACT 4413	Virology	
ZOOL 3123 & ZOOL 3121	Neuroanatomy and Neurophysiology and Neuroanatomy and Neurophysiology Laboratory	
ZOOL 3313	Biology of Aging	
ZOOL 3243 & ZOOL 3241	Systemic Anatomy and Systemic Anatomy Laboratory	
ZOOL 4243 & ZOOL 4241	Medical Physiology and Medical Physiology Laboratory	
Total SCHs		**64-65**

Pre-Physician Assistant Minor

All pre-PA students must take the following courses, which are required prerequisites for physician assistant studies. Lecture and lab must be taken concurrently; no exceptions. Students must earn a grade of "C" or higher. Twelve of the required semester credit hours may also satisfy core requirements as applicable. Pre-PA students are strongly encouraged to contact the Pre-Health Committee at prehealth@twu.edu for pre-professional advising and support.

Code	Title	SCHs
BIOL 1113 & BIOL 1111	Principles of Biology I and Principles of Biology I Laboratory	4
BIOL 1123 & BIOL 1121	Principles of Biology II and Principles of Biology II Laboratory	4
BACT 3113 & BACT 3111	General Microbiology and General Microbiology Laboratory	4
BIOL 4813 & BIOL 4811	Molecular and Cellular Biology: Gene Expression and Molecular and Cellular Biology: Gene Expression Laboratory	4
BIOL 4823 & BIOL 4821	Molecular and Cellular Biology: Genetics and Inheritance and Molecular and Cellular Biology: Genetics and Inheritance Laboratory	4
ZOOL 3243 & ZOOL 3241	Systemic Anatomy and Systemic Anatomy Laboratory	4
ZOOL 4243 & ZOOL 4241	Medical Physiology and Medical Physiology Laboratory	4
CHEM 1113 & CHEM 1111	General Chemistry I and General Chemistry Laboratory I	4
CHEM 1123 & CHEM 1121	General Chemistry II and General Chemistry Laboratory II	4
CHEM 2213 & CHEM 2211	Organic Chemistry I and Organic Chemistry Laboratory I	4
MATH 1703	Elementary Statistics I	3
PSY 1013	Introduction to General Psychology	3
Electives		
Select 9 SCH from the following:		9
BACT 4113 & BACT 4111	Immunology and Immunology Laboratory	
BACT 4413	Virology	
CHEM 3633 & CHEM 3632	Biochemistry I and Biochemistry I Laboratory	
HS 2373	Health Aspects of Human Sexuality	
HS 3033	Medical Terminology	
SOCI 1013	Introductory Sociology	
SPAN 1013	Elementary Spanish I	
Total SCHs		**55**

Scientific Illustration

Scientific Illustration is an interdisciplinary program focusing on the creation of images to depict and clarify scientific concepts. The Scientific Illustration minor combines study in biology with instruction in the visual arts to teach students how to merge their artistic talent with knowledge of natural science to develop strong visual communication skills.

Requirements

23-24 semester hours total, including 8 hours of biology, 12 hours of art, and 3-4 hours of electives.

Code	Title	SCHs
Select One of the following Biology course groups		**8**
BIOL 1113 & BIOL 1111	Principles of Biology I and Principles of Biology I Laboratory	

BIOL 1123 & BIOL 1121	Principles of Biology II and Principles of Biology II Laboratory	
OR		
ZOOL 2013 & ZOOL 2011	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
ZOOL 2023 & ZOOL 2021	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	
Visual Arts courses		
ART 1303	Drawing Foundations	3
ART 2223	Digital Art Foundations	3
ART 2303	Figure Drawing	3
ART 3913	Scientific Illustration	3
Elective - Choose one of the following		**3-4**
ART 2243	Fundamentals of Type and Image	
ZOOL 3123 & ZOOL 3121	Neuroanatomy and Neurophysiology and Neuroanatomy and Neurophysiology Laboratory	
ZOOL 4243 & ZOOL 4241	Medical Physiology and Medical Physiology Laboratory	
Total SCHs		**23-24**