

TEXAS ACADEMY OF MATHEMATICS AND SCIENCE

Biomedical Engineering Non-Premed Pathway Course Descriptions

Students at the Texas Academy of Mathematics and Science must pass all courses taken. The below course descriptions are taken from the University of North Texas catalog.

- BIOL 1711** *Honors Principles of Biology I*
An integrated approach to cell and molecular biology with an emphasis on biological chemistry, cell structure and function, Mendelian and molecular genetics, evolutionary biology.
- BIOL 1761** *Honors Biology for Science Majors Laboratory*
Laboratory techniques and research methods for introductory biology.
- BIOL 1722** *Honors Principles of Biology II*
An integrated approach to the anatomical, physiological and functional aspects of nutrition, gas exchange, transport, reproduction, development, regulation, response and ecology of microorganisms, plants and animals.
- BMEN 1300** *Discover Biomedical Engineering*
The course focuses on describing, explaining and predicting natural phenomena using a combination of two, 50-minute lectures and a 3-hour laboratory, every week. Students will learn about the origin and history of healthcare practices. Students will learn about human anatomy and physiology and thus be able to describe and explain natural phenomena that occur in the human body. They will also learn to describe naturally occurring action potentials in muscles and nerve cells, and predict the resulting bio-potentials such as electrocardiogram (ECG) and electromyogram (EMG), with reference to homeostasis or a disturbance to it. Students will learn about various systems in the body and how their working can be enhanced while improving the quality of life.
- BMEN 1400** *Software for Biomedical Engineers*
Introduction and exposure to common programming languages used in biomedical engineering practice; develop functions and algorithms for analysis of data; develop basic data acquisition functions.
- BMEN 2210** *Biomedical Circuits and Data Acquisition Best Practices*
Data acquisition and quantitative analysis of biomedical and physiological signals using LabVIEW; A/D conversion; basic transforms; power supply consideration for biomedical systems; filtering of biomedical signals; electrical circuits and analog representations of physiological systems.
- BMEN 2320** *Biomedical Instrumentation I*
Introduction to biomedical instrumentation design; design, building and testing of bioinstrumentation circuits including power supplies, analog signal amplifiers and analog filter circuits.
- CHEM 1410** *General Chemistry for Science Majors*
Fundamental concepts, states of matter, periodic table, structure and bonding, stoichiometry, oxidation and reduction, solutions, and compounds of representative elements.
- CHEM 1413** *Honors General Chemistry*
Fundamental concepts, states of matter, periodic table, structure, solutions and compounds of representative elements.

- CHEM 1420** *General Chemistry for Science Majors*
Thermodynamics, reaction rates, equilibrium, electrochemistry, organic chemistry, polymers, radioactivity and nuclear reactions.
- CHEM 1423** *Honors General Chemistry*
Thermodynamics, reaction rates, equilibrium, electrochemistry and nuclear chemistry. This course is strongly advised and may be required for students planning to engage in undergraduate chemical research.
- CHEM 1430** *Laboratory Sequence for General Chemistry*
Laboratory techniques, weighing, errors and significant figures, identification and purification of substances, and elementary quantitative analysis.
- CHEM 1440** *Laboratory Sequence for General Chemistry*
Quantitative, gravimetric and volumetric analyses; coordination compounds.
- ENGL 1315** *Writing about Literature I*
Writing as a means of critical thinking using readings from poetry and drama as sources.
- ENGL 1325** *Writing about Literature II*
Study of relationship between writing and research with research topics drawn from readings from prose fiction. Emphasis on the process of perfecting the essay through the writing of several drafts.
- ENGL 2331** *World Literature*
Comparative and critical reading skills from a global perspective, tracing significant literary themes, texts, movements and genres across a wide range of world literatures and cultures from ancient times to the present day.
- HIST 2610** *United States History to 1865*
From colonial origins through the Civil War.
- HIST 2620** *United States History since 1865*
From the Civil War to the present.
- MATH 1650** *Pre-Calculus*
Preparatory course for calculus: trigonometric functions, their graphs and applications; sequences and series; exponential and logarithmic functions and their graphs; graphs of polynomial and rational functions; general discussion of functions and their properties.
- MATH 1710** *Calculus I*
Limits and continuity, derivatives and integrals; differentiation and integration of polynomial, rational, trigonometric, and algebraic functions; applications, including slope, velocity, extrema, area, volume and work.
- MATH 1720** *Calculus II*
Differentiation and integration of exponential, logarithmic and transcendental functions; integration techniques; indeterminate forms; improper integrals; area and arc length in polar coordinates; infinite series; power series; Taylor's theorem.
- MATH 2700** *Linear Algebra and Vector Geometry*
Vector spaces over the real number field; applications to systems of linear equations and analytic geometry in E_n , linear transformations, matrices, determinants and eigenvalues.

- MATH 3410** *Differential Equations I*
First-order equations, existence-uniqueness theorem, linear equations, separation of variables, higher-order linear equations, systems of linear equations, series solutions and numerical solutions.
- PHYS 1710** *Mechanics*
Laws of motion; inertia, acceleration, force, energy, momentum and angular momentum. Rotational and oscillatory motion. Gravitation.
- PHYS 1730** *Laboratory in Mechanics*
Laboratory to accompany PHYS 1710.
- PHYS 2220** *General Technical Physics: Electricity and Magnetism (Calculus based)*
Electric fields, dc and ac circuits, magnetic fields and magnetic induction. Electric and magnetic properties of matter.
- PHYS 2240** *Laboratory in Wave Motion, Electricity, Magnetism, and Optics*
Laboratory to accompany PHYS 2220.
- PSCI 2305** *US Political Behavior and Policy*
Explores the connection between the will of the people and the policies implemented by government by focusing on individual political values and attitudes, the mechanisms that connect individual beliefs to government action (parties, interest groups, the media, and elections), and the outcomes of government policy.
- PSCI 2306** *US and Texas Constitutions and Institutions*
An introduction to the institutions of government, with particular emphasis on the U.S. and Texas Constitutions. Focus on the structure and powers of the three branches of government (both national and Texas); the division of power between those branches (separation of powers); the division of power between the national and state governments (federalism); and issues related to civil rights and civil liberties. Satisfies the legislative requirement for a course emphasizing the Texas constitution.
- TECM 2700** *Technical Writing*
Expository writing, especially for science, pre-engineering and business students.

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