

TEXAS ACADEMY OF MATHEMATICS AND SCIENCE

Materials Science and Engineering Pathway Course Descriptions

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

- 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 for essay topics. Emphasis on the process of perfecting the essay through the writing of several drafts.
- 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 2730** *Multivariable Calculus*
Vectors and analytic geometry in 3-space; partial and directional derivatives; extrema; double and triple integrals and applications; cylindrical and spherical coordinates.
- 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.
- MTSE 1100** *Discover How and Why Materials "Matter"*
This course serves as the heart of the MSE first year experience. Topics include rationale for materials choices, composition and design of everyday items and how materials science and engineering drives innovation. Basic analysis and experimental design. A team-based hands-on project teaches the student to think critically and creatively by applying a range of analysis techniques borrowed from many engineering and science disciplines.
- MTSE 3000** *Fundamentals of Materials Science and Engineering I*
Introduces the fundamentals of materials science and engineering, including atomic interactions, introduction of crystalline and non-crystalline structures, the concept of materials defects, the evolution of microstructure/structure, the influence of composition and processing on microstructure, and how composition and structure impact the properties of a wide variety of engineering material.
- MTSE 3003** *Fundamentals of Materials Science and Engineering Laboratory*
Laboratory designed to introduce students to the fundamentals of materials science and engineering. Students gain hands-on experience with processing and characterization of metals, ceramics, and polymers. Topics include optical metallography, tensile testing, hardness testing, impact testing, heat treating, melting and casting. Students perform experiments, analyze results, write reports, and give presentations.
- MTSE 3010** *Bonding and Structure*
Amorphous and crystalline structures in metals, ceramics and polymers, point defects in crystals, structure determination by X-ray diffraction.
- 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** *Electricity and Magnetism*
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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