# ENGINEERING/PHYSICAL SCI-AS

## Program Overview

**Associate of Science - Engineering and Physical Science**

**Student Learning Outcomes**

This program provides students with a solid base of mathematics, physics, chemistry, and computer science required of students in the first two years of baccalaureate degrees in engineering and physical science (chemistry, physics, etc.) programs. Completion of this associate degree assures completion of lower-division general education requirements of NSHE colleges and universities, though not all lower division engineering and physical sciences courses required by specific programs that a student may be transferring to are provided. This class guide provides a solid pattern of study for lower-division engineering and physical science students transferring to any college or university. It is important to work with an advisor and to know in advance where the student intends to transfer. This recommended program outlines assumes the student is ready to begin a rigorous program with calculus being taken in the first semester. Students needing additional preparation before taking calculus, physics, chemistry, or computer science should consider taking the recommended preparatory electives (listed below) which fulfill associate degree requirements.

Upon completion of the program students will earn an AS degree and will have the ability to:

- Transfer to a four-year level engineering or physical sciences (chemistry, physics) degree program.
- Work at the level of a junior engineer in either the electrical, mechanical, or chemical fields.

**General Education Requirements**

**Communications and Expressions**

**Written Communications (one course required)**

**ENG 100 Composition-Enhanced** **5 Credits**

Allows students to fulfill their first semester of English while completing the remediation process. Designed for students who did not place into ENG 101 on the placement test/writing sample, but did not score so low that they need ENG 95. Allows a student to refine specific skill deficiencies while completing the first semester of freshman composition (ENG 100 is equivalent to ENG 101). Students will have additional Academic Success Center requirements. Although it is a five-credit course, it does not replace ENG 102. After successful completion of ENG 100, a student must take ENG 102 to complete the general education requirement.

**ENG 101 Composition I** **3 Credits**

Critical reading and writing of the expository essay. Emphasizes pre-writing, strategies for organization, and revision.

**Oral Communications (one course required)**

**COM 113 Fund Speech Communication** **3 Credits**

Principles and theories of speech communication. Participation in public speaking and interpersonal communication activities.

**THTR 221 Oral Interpretation** **3 Credits**

Introduction to and practice of oral interpretation of literary and dramatic works from Shakespeare to contemporary writers and poets.

**Evidence-Based Communications**

**ENG 102 Composition II** **3 Credits**

Continuation of English 101. Emphasizes writing from sources, argument, the investigative paper, and research techniques.

**Fine Arts (one course required)**

**ART 100 Visual Foundations** **3 Credits**

A beginning art class that includes a survey of art and the basic components of design. The class explores visual concepts as they relate to the history of art through class presentations, discussions, and a variety of media. Students should plan for three hours of studio work outside the class.

**ART 101 Drawing I** **3 Credits**

A disciplined foundation in drawing concepts based on visual observation skills.

**ART 107 Design Fundmntls I (2-D)** **3 Credits**

Explores the fundamentals of design using various media focusing on 2-D design.

**ENG 205 Intro to Creative Writing** **3 Credits**

A creative writing course designed to introduce students to the production of fiction and poetry.

**MUS 101 Music Fundamentals** **3 Credits**

Notation, terminology, intervals, and scales. Designed to furnish a foundation for musicianship. Recommended for teachers in public schools and all others desiring a basic music background.

**THTR 100 Introduction to Theatre** **3 Credits**

A survey of the basic principles, facts, and theories providing an understanding of the art of theatre. Course also includes a special focus on the practical technical aspects of the theatre and on live theatre experiences.

**THTR 105 Introduction to Acting I** **3 Credits**

Examines acting fundamentals and focuses on development of vocal, physical, and creative tools to be used on stage.

**THTR 121 Stage Makeup** **3 Credits**

This course focuses on the history of makeup and basic approaches to applying make-up for the stage and screen. Make-up supplies will be studied, as well as techniques for corrective, old-age, character, stylized, and special effects makeup.

**THTR 204 Theatre Technology I** **3 Credits**

Lecture and discussion encompassing the philosophy and techniques of technical theatre.

**WELD 200 Metal Art** **3 Credits**

This course is designed to give the student the basic understanding of two dimensional 2D and three-dimensional 3D metal art. Also covered in this course we will discuss different Cutting, Welding and metal finishing techniques that are used in this discipline as it relates to metal art.

**Logical and Scientific Reasoning**

**Mathematical Reasoning**

**MATH 181 Calculus I** **4 Credits**

The fundamental concepts of analytic geometry and calculus functions, graphs, limits, derivatives, integrals, and certain applications. It is recommended that students have completed prerequisites within two years of enrolling in this course.

**Scientific Reasoning**

**CHEM 122 General Chemistry II** **4 Credits**

Fundamentals of chemistry including solutions, kinetics, equilibria, thermodynamics, electrochemistry, nuclear chemistry, and properties of inorganic and organic compounds. Also, introduction to qualitative analysis.

**Scientific Data Interpretation**

**CHEM 121 General Chemistry I** **4 Credits**

Fundamentals of chemistry including reaction stoichiometry, atomic structure, chemical bonding, molecular structure, states of matter, and thermochemistry.

**Human Societies and Experience**

**Structure of Societies (one course required)**

**ANTH 101 Intro Cultural Anthropology** **3 Credits**

Study of human cultures across the globe through examination of the basic principles underlying the organization of societies and the ways anthropologists analyze various parts of culture. Students will become familiar with the glue that holds all groups of people together, and how that glue can divide groups of people in profound ways.

**CRJ 104 Intro to Admin of Justice** **3 Credits**

American criminal justice system, its development, components, and processes. Includes consideration of crime and criminal justice as a formal area of study.

**CRJ 270 Intro to Criminology** **3 Credits**

Examines how society interacts with crime and delinquency through the use of the criminal justice system. Studies effective interaction and communication between the general public and members of the criminal justice system. Emphasizes the understanding of criminal behavior from a sociological and psychological perspective.

**ECON 102 Prin of Microeconomics** **3 Credits**

Study of the causes and effects of individuals' choices among alternative uses of scarce resources. Topics include supply and demand analysis, price determination, theories of various market structures, competition and coordination, labor, the role of profit and interest, and government involvement in the economy.

**ECON 103 Principles of Macroeconomics** **3 Credits**

Basic price and quantity relationships, study of monetary systems and policy, inflation, production and growth, recession, unemployment, fiscal policy, supply and demand perspectives, international exchange, and governmental-market relationships.

**GEOG 106 Intro to Cultural Geography** **3 Credits**

Analyze the culture regions of the world including physical settings and cultural patterns including language, settlements, socioeconomic patterns, and historical patterns.

**HMS 200 Ethics in Human Services** **3 Credits**

Real life applications for personal and professional boundaries, beliefs, ethics, values, morals, and codes of conduct in human relationships using ethical decision-making, problem-solving, and critical-thinking activities are emphasized. This course may be repeated up to three times for continuing education credit. (Check with individual licensing boards prior to registering).

**PSY 101 Gen Psychology** **3 Credits**

Survey of the discipline introducing psychological theories, research methods, and principles of behavior.

**PSY 208 Psy of Human Relations** **3 Credits**

Explores the relationships between human beings and assists in the development of interpersonal communication skills which can be used personally and professionally.

**SOC 101 Prin of Sociology** **3 Credits**

Sociological principles underlying the development, structure, and function of culture including society, human groups, personality formation, and social change.

**American Constitutions and Institutions**

**PSC 101 Intro American Politics** **3 Credits**

A survey of United States, national, state, and local governments with emphasis on the cultural aspects of the governing process. Satisfies the legislative requirement for the United States and Nevada Constitutions.

**Humanities (one course required)**

**ART 160 Art Appreciation** **3 Credits**

Introduction to the visual arts, illustrating the place of art in its social and cultural setting.

**ENG 203 Intro to Literary Study** **3 Credits**

Introduction to the elements of fiction, poetry, and drama used in the analysis of literature.

**ENG 223 Themes of Literature** **3 Credits**

Themes and ideas significant in literature.

**FIS 100 Introduction to Film** **3 Credits**

Introduction to the historical development of film as art. Considers the development of cinematic techniques (i.e., cinematography, editing, sound, etc.), cinematic genres (i.e., the western, romantic comedy, etc.) and narrative elements (i.e., plot, character, conflict, etc.) as exemplified by the work of major American and international directors.

**FREN 111 First Year French I** **3-4 Credits**

Development of language skills through practice in listening, speaking, reading, writing, and structural analysis. Language practice required.

**FREN 112 First Year French II** **3-4 Credits**

A continuation of FREN 111. Language practice required.

**HIST 208 World History I** **3 Credits**

Survey of world civilizations to 1600. Examines societies, cultures, and issues relative to Africa, the Americas, Asia, Europe, the Middle East and Oceania.

**HIST 209 World History II** **3 Credits**

Survey of world civilizations since 1600. Examines historical societies, cultures, and issues relative to Africa, the Americas, Asia, Europe, the Middle East, and Oceania.

**HUM 101 Intro to Humanities I** **3 Credits**

An introduction to humanities through a study of seven major arts including film, drama, music, literature, painting, sculpture, and architecture. Each of these arts is considered from the perspective of historical development, the elements used in creating works of art, meaning and form, and criticism and critical evaluation.

**HUM 210 Communicating Diversity** **3 Credits**

Communicating Diversity is a lower division course designed to familiarize students with the fundamentals of diversity and how those are expressed through communication. Students will develop a deep understanding of the way in which we communicate race, gender, class, sexual orientation, nationality, religion, and physical/mental ability and how it impacts our daily lives. This course will take an intersectional approach to understanding diversity and seek communication strategies for inclusivity. Emphasis will be placed on defining and developing the critical thinking skills necessary to push past oppression, marginalization, and other issues centralized around diverse populations. Students will be encouraged to investigate and discover diversity issues, solutions, and concepts at the local and global level using case studies, current events, and other significant moments in history.

**MUS 121 Music Appreciation** **3 Credits**

The historical and cultural background of music and origins to the twentieth century.

**PHIL 101 Intro to Philosophy** **3 Credits**

Basic problems in different areas of philosophy such as ethics, political theory, metaphysics, and epistemology.

**PHIL 102 Critical Thinking** **3 Credits**

Covers non-symbolic introduction to logical thinking in everyday life, law, politics, science, advertising; common fallacies; and the uses of language, including techniques of persuasion.

**PHIL 135 Introduction to Ethics** **3 Credits**

Introduction to Ethics: critical introduction to classical and modern ethical theories such as utilitarianism, deontology, and virtue ethics. Emphasis throughout on applying the theories in various contexts such as social, political, or interpersonal. The ultimate goal will be to allow students to clarify their own thinking and positions on important ethical issues confronting society today.

**SPAN 111 First Year Spanish I** **3 Credits**

Development of language skills through practice in listening, speaking, reading, writing, and structural analysis. Language practice required.

**SPAN 112 First Yr Spanish II** **3 Credits**

A continuation of SPAN 111. Language practice required.

**SPAN 211 Second Year Spanish I** **3 Credits**

Considers structural review, conversation and writing, and readings in modern literature.

**Technological Proficiency**

**ENGR 100 Intro to Engineering Design** **3 Credits**

This course is an overview of engineering practices and provides exposure to the engineers working environment. Introduces engineering design, professional ethics, project planning, prototype fabrication, engineering creativity, and overview of engineering disciplines. Student groups carry out a semester-long design project while learning to be a part of an engineering team.

**Foundations**

**Mathematics**

**MATH 182 Calculus II** **4 Credits**

A continuation of MATH 181. The course covers transcendental functions, methods of integration, conic sections, infinite sequences and series, and first-order differential equations. It is recommended that students have completed prerequisites within two years of enrolling in this course.

**Science**

**PHYS 180 Physics Scientist/Engr I** **4 Credits**

**A comprehensive, calculus-based physics course designed for advanced science and engineering students. Consists of intensive word problem solving covering topics of kinematics, vectors, forces, energy, momentum, rotation, angular momentum, equilibrium, elasticity, gravity, fluids, and oscillations. Lab included.**

**Program Requirements**

**MATH 283 Calculus III** **4 Credits**

A continuation of MATH 182. Topics include vectors, differentiation and integration of vector-valued functions, the calculus of functions of several variables, multiple integrals and applications, line and surface integrals, Green's Theorem, Stokes' Theorem, and the Divergence Theorem. It is recommended that students have completed prerequisites within two years of enrolling in this course.

**MATH 285 Differential Equations** **3 Credits**

Theory and solving techniques for general ordinary differential equations, first order and second order linear equations, boundary value problems, power series solutions, Laplace transforms, and system of first order equations. Emphasis on real world phenomena. It is recommended that students have completed prerequisites within two years of enrolling in this course.

**PHYS 181 Physics Scientist/Engr II** **4 Credits**

A calculus-based investigation of thermodynamic laws, kinetic theory, electric charge, field, potential, current, dielectrics, circuit elements, magnetic fields and materials, electromagnetic oscillations. Lab included.

**ENGR 241 Statics** **3 Credits**

Static force systems. Topics include resolution and composition of forces, equilibrium of force systems, friction, centroids, moments of inertia, mass moments of inertia, cables, beams, fluid statics, and work.

**ME 242 Dynamics** **3 Credits**

Kinematics and kinetics of particles and rigid bodies in two and three dimensions; relative motion; work and energy; impulse and momentum.

**EE 220 Circuits I** **3 Credits**

This course is an introduction to analysis methods and network theorems used to describe operation of electric circuits. Topics covered include resistive, capacitive, and inductive components in DC and AC circuits.

**EE 220L Circuits Laboratory** **1 Credits**

This laboratory course introduces students to fundamental analysis methods and network theorems used to describe the operation of electric circuits. Topics include resistive, capacitive, and inductive circuits in DC and AC domains. Students will construct and analyze circuits, verify theoretical principles experimentally, and use circuit simulation software (Multisim) to support their findings. (Required for BME and EE majors)

**Suggested Course Sequence**

## 1st Semester - Fall

| Course | Credits |
|---|---|
| CHEM 121 | 4 |
| ENG 100 or 101 | 3-5 |
| ENGR 100 | 3 |
| MATH 181 | 4 |
| TOTAL | 14-16 |

## 2nd Semester - Spring

| Course | Credits |
|---|---|
| PHYS 180 | 4 |
| CHEM 122 | 4 |
| Fine Arts* | 3 |
| ENG 102 | 3 |
| MATH 182 | 4 |
| TOTAL | 18 |

*Choose with advisor

## 3rd Semester - Fall

| Course | Credits |
|---|---|
| MATH 283 | 4 |
| Oral Communications* | 3 |
| PHYS 181 | 4 |
| ENGR 241 | 3 |
| Humanities* | 3 |
| TOTAL | 17 |

*Choose with advisor

## 4th Semester - Spring

| Course | Credits |
|---|---|
| MATH 285 | 3 |
| PSC 101 | 3 |
| ME 242 | 3 |
| EE 220 | 3 |
| EE 220L | 1 |

| Course | Credits |
|---|---|
| Structure of Societies* | 3 |
| TOTAL | 16 |

*Choose with advisor