STEM: SCIENCE, TECHNOLOGY, ENGINEERING AND MATH

Associate Degrees

Associate in Science (AS) Degrees

The College Transfer Office (https://www.dccc.edu/admissions-financial-aid/transfer/transfer-office/) is set up to help Delaware County Community College students transfer to four-year colleges and universities. If you are planning to transfer, you are strongly encouraged to meet with a transfer advisor within your first two semesters (or before you reach 30 transferable college credits from all institutions attended).

Engineering (EGR) (https://catalog.dccc.edu/academic-programs/programs-study/engineering-as/)

The Engineering program is a two-year preparatory curriculum for students who plan to continue their education at a four-year institution and complete their major in an engineering science field.

Mathematics/Natural Science (MNS) (https://catalog.dccc.edu/academic-programs/programs-study/mathematics-natural-science-as/)

The Mathematics and Natural Science Program provides a strong foundation for students who plan to attend a four-year institution and major in mathematics or one of the natural sciences. Students who complete the program requirements will be prepared to continue their education in order to pursue academic, research, or industrial careers in such diverse areas as biology, biotechnology, ecology, wildlife biology, chemistry, biochemistry, astronomy, geology, physics, mathematics and applied mathematics. Students are strongly encouraged to meet with a mathematics or natural science faculty advisor and consult with the DCCC Transfer Office prior to course selection to determine the appropriate sequence and level of courses.

Science for Health Professions (HSCI) (https://catalog.dccc.edu/academic-programs/programs-study/science-health-professions-as/)

The Science for Health Professions Program is designed for students who plan to transfer and continue their education in an allied health or pre-medical field at another institution. It provides the basic sciences and mathematics needed for a variety of programs, including Physical Therapy, Occupational Therapy, Baccalaureate Nursing, Physician Assistant, Pharmacy, Medicine, Dentistry, Veterinary Medicine, Optometry and Podiatry. Since admission requirements to other institutions vary, students should obtain information on entrance requirements for the specific school and program in which they are interested. Students are strongly encouraged to consult with both the Transfer Office at DCCC and their advisor regarding the best course selections for their transfer.

Courses

View full A-Z Course List

BIO - Biology

BIO 100 Biological Sciences

Students in this course will explore the following aspects of biology: the organization of life, the development of living organisms, the transmission of traits, evolution, behavior and ecology. This course is intended for the non-science degrees. BIO 100 should not be taken in conjunction with BIO 110 or BIO 111.

Upon successful completion of this course, students should be able to:
Analyze the characteristics of life as currently understood.
Relate the life characteristics to the simplest level of existence: the single cell.
Explain various patterns of reproduction among plants and animals.
Evaluate various techniques of population control.
Explore the mechanism by which traits are transmitted from parent to offspring.
Summarize the causes and effects of various types of mutations.
Trace the history of the modern concept of evolution.
Survey the system of classification of plants and animals.
Interpret behavior as an illustration of the modern concept of evolution.
Relate the sources and the effects of pollutants to the quality of the environment.
Demonstrate an understanding of laboratory experiments as they relate to the biological concepts presented in the above competencies.
College Academic Learning Goal Designation: Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 102 Humans and the Environment

This course provides an introduction to the study of the design of the natural world and interactions between humans and their environment. It includes an investigation of the impact of human activities on biodiversity, natural resources, availability of energy and contamination of the environment. The scientific, economic and social issues that contribute to environmental problems are also examined. Sustainability principles, policies, and programs are explored on the local, national and global level. This course is an elective designed for non-science majors.

Upon successful completion of this course, students should be able to:
Describe the components of the natural world and analyze their relationships with each other.
Describe the population dynamics of different species, excluding humans in the biosphere.
Explain the effects that human activities have on Earth's capacity to sustain biodiversity and natural resources.
Describe the relationship between human population dynamics and environmental change.
Analyze the energy alternatives available to meet the demands of the human population on the world's natural resources.
Identify local, national, global policies that impact the sustainability of natural resources and biodiversity.
Identify sustainable practices that can help mitigate global environmental problems.
Describe the effect of economic development and conflict on environmental impact.
Demonstrate the necessary laboratory skills to measure and analyze environmental parameters.
Demonstrate an understanding of laboratory experiments as they relate to ecological concepts.
College Academic Learning Goal Designation: Global Understanding (GU), Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 110 General Biology I
General Biology I is designed for majors in biology, natural science and related fields. This course introduces students to the general principles of biology, emphasizing cell structure and function, molecular biology, genetics, and evolution. Students are expected to develop skills in utilizing the scientific method as a tool for problem solving.
Upon successful completion of this course, students should be able to:
Utilize the scientific method to solve problems.
Describe the chemical structure of biological molecules.
Relate molecular structure to biological function.
Describe prokaryotic and eukaryotic cell structure.
Relate cellular structure to cell function.
Explain the processes by which living systems convert solar energy to usable chemical energy.
Identify the role of genetic material in transmission of traits from generation to generation.
Relate variability in the transmission of genetic material to biological evolution.
Critique current theories on the origin of life on Earth.
Access, interpret, and evaluate peer-reviewed primary scientific literature.
Demonstrate an ability to utilize modern biology laboratory skills.
Demonstrate an ability to apply biological concepts to one's life.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 111 General Biology II
General Biology II is designed for majors in biology, natural science, and related fields. This course focuses on the structure, function, and diversity of organisms with an emphasis on their evolutionary and ecological relationships.
Upon successful completion of this course, students should be able to:
Relate taxonomic classification to biological evolution.
Describe patterns and processes of embryological development in animals.
Relate structure to function in animal organ systems.
Relate reproductive patterns to classification of the major phyla of plants.
Characterize the features of selected organisms in the Kingdom Fungi.
Demonstrate the polyphyletic nature of the Kingdom Protista.
Characterize the evolutionary and ecological significance of bacteria.
Discuss the impact of viruses on organisms.
Interpret the ecological significance of organisms within various taxa.
Access, interpret, and evaluate peer-reviewed primary scientific literature.
Demonstrate an ability to utilize modern biology laboratory skills.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 115 Field Ecology
Field Ecology is designed primarily for majors in biology, natural science, and related fields, yet is open to students of all majors. This course introduces students to the general principles of field ecology pertaining to terrestrial, aquatic, and marine habitats. Emphasis will be placed upon regional conservation issues, biodiversity concepts, plant and animal interactions and adaptations, effects of human disturbance on native flora and fauna, and field research techniques. Students are expected to develop and apply skills in field research and in utilizing the scientific method.
Upon successful completion of this course, students should be able to:
Apply the scientific method to test hypotheses.
Develop and apply skills used to identify, survey, and study plants and animals in a field setting.
Describe local, regional, and global trends in biodiversity.
Describe the processes and mechanisms that may affect biodiversity at local, regional, and global scales.
Develop an appreciation of the ecological and economic value of biologically diverse habitats.
Develop an appreciation of the value of diverse perspectives in a multicultural setting.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 150 Human Anatomy and Physiology I
The first course in a two-semester sequence that covers the basic structure and function of the human body using a systems approach. Major topics covered include biological chemistry, cell biology, histology, integumentary system, skeletal system, muscular system, and nervous system. Laboratory work includes dissection, microscopy, models, and experimental demonstration of concepts covered in class. Dissection of preserved animal specimens is required. This course is designed primarily for students majoring in nursing or allied health fields. NOTE: BIO 110 (Introductory Biology I) is suggested, but not required, before enrolling in Human Anatomy & Physiology I.
Upon successful completion of this course, students should be able to:
Demonstrate the correct usage of basic anatomical terminology.
Describe how the body uses feedback systems to maintain homeostasis.
Apply basic chemical concepts to the study of human physiology.
Compare the major organic molecules found in the human body and describe their functions.
Relate cell ultrastructure to the various functions performed by the cell.
Compare the major tissues found in the human body and relate their structure and location to specific functions.
Describe how the structure of the skin contributes to its function.
Describe the organization and function of the skeletal system.
Categorize joints according to their structure and function.
Analyze the ultrastructure of skeletal muscle and explain the mechanism of muscle contraction.
Demonstrate an understanding of the physiology of nerve impulse generation and propagation.
Analyze the structure and function of the spinal cord and spinal nerves.
Analyze the structure and function of the brain and cranial nerves.
Demonstrate an understanding of how the autonomic nervous system functions to maintain homeostasis.
Relate the structure and location of the various sensory receptors to the perception of specific sensations.
Demonstrate an ability to perform modern laboratory skills, including dissection and microscopy.
Collect and analyze experimental data, formulate appropriate conclusions, and compile lab reports.
Apply concepts learned in this course to one's personal health.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 151 Human Anatomy and Physiology II
The second course in a two-semester sequence that covers the basic structure and function of the human body using a systems approach. Major topics covered include the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems along with immunity, metabolism, and fluid, electrolyte, and acid-base homeostasis. Laboratory work involves dissection, microscopy, models, and experimental demonstration of concepts covered during class. Dissection of preserved animal specimens is required. This course is designed primarily for students majoring in nursing or allied health fields. NOTE: Pre-req requires grade of 'C' or better.
Upon successful completion of this course, students should be able to:
Evaluate the role of hormones in regulating body functions.
Categorize the components of the blood and describe their functions.
Demonstrate an understanding of cardiac anatomy and physiology.
Relate the structure of the blood vessels to the hemodynamics of blood flow.
Examine the structure and function of the lymphatic system.
Analyze how the immune system functions to defend the body against disease.
Demonstrate an understanding of respiratory anatomy and physiology.
Demonstrate an understanding of digestive anatomy and physiology.
Analyze how major metabolic pathways are used by the body.
Examine the role of the urinary system in maintaining homeostasis.
Assess the body's ability to maintain fluid, electrolyte, and acid-base homeostasis.
Relate the structure of the male reproductive system to its function.
Relate the structure of the female reproductive system to its function.
Demonstrate an understanding of conception, pregnancy, embryonic and fetal development, including an introduction to human inheritance.
Demonstrate an ability to perform modern laboratory skills, including dissection and microscopy.
Collect and analyze experimental data, formulate appropriate conclusions, and compile lab reports.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 200 General Zoology
A hands on survey of the animal kingdom, with emphasis on evolutionary relationships, form and function, and interactions of animals with their environments. NOTE Pre-Req BIO 111 is recommended but not required.
Upon successful completion of this course, students should be able to:
Integrate evolutionary theory into the study of the phylogeny of animals.
Distinguish, by comparative biology, the major groups of animals.
List and describe the distinguishing characteristics of the Kingdom Animalia, including a comparison of the phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata, and Chordata.
Describe the characteristics, comparative biology, and evolutionary relationships of extant vertebrate classes.
Describe the physiology of organisms in each of the major phyletic groups.
Demonstrate the skills required of microscopic examination of animal tissues/specimens and gross animal dissection.
Access, interpret, and evaluate peer-reviewed, primary literature in the zoological sciences.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 210 General Botany
A survey of the major plant groups with an emphasis on basic structure, function, reproductive patterns, biological contributions, development and evolutionary relationships within each group. NOTE Pre-Req BIO 111 is recommended but not required.
Upon successful completion of this course, students should be able to:
Describe basic comparative plant anatomy, morphology, and physiology.
Describe and recognize the distinguishing characteristics of diverse groups within the Plant Kingdom including bryophytes, ferns and fern allies, gymnosperms, and angiosperms.
Discuss the major evolutionary advances in plant form and function.
Describe life cycles of representative algae, bryophytes, ferns and fern allies, gymnosperms and angiosperms and relate to major evolutionary advances in plants and related organisms.
Explain the importance of botany as a past, present, and future science.
Describe concepts and theory pertaining to modern plant ecology.
Demonstrate laboratory and field skills required of examination and identification of plant tissues and specimens.
Access, interpret and evaluate peer-reviewed, primary scientific literature.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 220 Nutrition and Well Being
This is a one semester course covering the basic principles of human nutrition and their application to the maintenance of lifelong health and well-being. It is designed to fulfill the requirements of certain allied health and nursing programs, and so is taught by a dietitian/nutritionist licensed by the Commonwealth of Pennsylvania. Essential dietary requirements are introduced along with digestive anatomy and physiology. Food sources, chemistry, and digestion of proteins, carbohydrates and fats are discussed. Recommended vitamin and mineral intakes are covered, including the detrimental effects of deficient or toxics intakes. Energy balance issues and clinical problems associated with poor nutrition are considered. Students are required to complete an online nutritional assessment of their daily nutrient intake.
Upon successful completion of this course, students should be able to:
Analyze the nutrient requirements for a healthy, balanced nutrition style.
Perform and interpret an electronic nutritional analysis.
Relate basic nutrients to various established dietary guidelines.
Interpret the effects of nutrient deficiencies and megadoses.
Demonstrate understanding of energy balance and problems associated with energy balance.
Recognize conditions and diseases which can place patients/clients at nutrition risks.
3 Credits 3 Weekly Lecture Hours

BIO 230 Introduction to Microbiology
Introduction to Microbiology is designed to examine the biology of microorganisms and their significance to human existence. Cellular structures, metabolic pathways and life strategies will be studied. The roles of microorganisms in disease, genetic engineering, and the environment will also be covered. The course is designed for students in the Science for the Health Professions curriculum.
Upon successful completion of this course, students should be able to:
Examine the evolutionary relationships between microorganisms and macroorganisms.
Describe the cellular biology of single-celled organisms.
Analyze the impact of microorganisms on humans.
Analyze the life strategies of various bacterial cells.
Apply the standard techniques for the study of microorganisms in the laboratory.
Apply the standard laboratory skills to identify unknown bacteria.
Describe the properties of the genetic material in bacteria and viruses.
Explain the role of microorganisms in genetic engineering.
Examine the role of microorganisms in disease.
Describe the various strategies used for control of infectious disease.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

BIO 240 General Microbiology
General Microbiology is intended for Mathematics, Natural Science majors. This course will provide an introduction to the basic concept of microbial evolution, physiology, ecology, genetics and pathogenesis. This course meets the competencies outlined in the Pennsylvania state-wide articulation agreement for preparation in Microbiology.
Upon successful completion of this course, students should be able to:
Describe the characteristics and classifications of various groups of rnicrobes, including bacteria, archaea, protists, fungi, helminthes, prions, viruses and vitoids.
Describe the structure and function of the cellular structure of prokarotes and eukaryotes.
Describe the metabolic pathways utilized by prokaryotes including glycolytic pathways, fermentation, respiration, and photosynthesis.
Describe methods of prokaryotic reproduction and interpret a bacterial growth curve.
Describe gene expression, regulation and transfer in prokaryotes.
Explain strategies of viral infection and replication.
Explain the major steps in the evolution of life on Earth.
Describe the symbiotic relationships the microbes have with other organisms, including mutualism, parasitism and commensalism.
Explain the role of microbes in biogeochemical cycles and the production of commercially and medically important materials.
Examine the role of microorganisms in disease.
Access, interpret and evaluate peer-reviewed primary scientific literature.
Demonstrate safe laboratory practices and competency in the use of aseptic procedures for the safe handling of live microbes.
Use laboratory techniques to identify an "unknown" organism.
Apply standard techniques used for the study of microorganisms in the laboratory.
4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

BIO 250 Genetics

Genetics examines how molecular information relates to the appearance and behavior of living things and how this information is transferred from one organism to another. Course topics include Mendelian genetics, DNA replication, gene expression, chromosomal structure, population genetics, evolution, and current laboratory techniques used to study genetic material and heredity in living organisms. This course meets the competencies outlined in the Pennsylvania Statewide Program-to Program Articulation Agreement in Biology for preparation in Genetics and is designed for Mathematics-Natural Sciences (MNS) students.

Upon successful completion of this course, students should be able to:

Relate the principles of Mendelian genetics to the underlying molecular mechanisms of inheritance.

Apply the principles of Mendelian genetics to genetic crosses.

Describe how the nucleic acid sequences (genotype) relates to the physical characteristics and abilities of an organism (phenotype).

Examine the processes of DNA replication, mitosis, and meiosis and how these processes result in genetic variation between organisms.

Describe the structure of chromosomes and how genetic information of organisms is packaged.

Relate genetic principles to the process of evolution.

Describe and apply current genetic models of inheritance in populations.

Examine modern genetic and genomic techniques, analysis, and manipulation.

Apply standard laboratory techniques used in genetics, including production and analysis of genetic crosses, microscopic study of chromosomes, DNA isolation, electrophoresis, handing and genetic analysis of microbes, restriction digests, and bacterial transformation.

Design, conduct, and evaluate a genetic cross.

4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

CHE - Chemistry

CHE 101 Introduction to General Chemistry

CHE 101 is a one semester course covering the fundamentals of general chemistry. It is designed to fulfill the requirements of certain allied health and nursing programs. It also is appropriate as a basic chemistry course or as a science elective for students who are not science, engineering, or mathematics majors. Although not a prerequisite, this course may also serve as preparatory course for CHE 110 – General Chemistry I. Topics include: atomic theory, chemical bonding, structure, reactivity, stoichiometry, basic chemical equilibrium, gas laws, solutions, acids and bases, and nuclear chemistry.

Upon successful completion of this course, students should be able to:

Define chemistry as the study of matter.

Describe its transformations and the energy associated with these transformations.

Apply the concepts of atomic theory and atomic structure to describe elements and how they combine to form compounds.

Predict and identify the products and reactants of a chemical reaction, and quantify the amounts of materials consumed and produced using basic stoichiometry.

Apply the concepts of the kinetic molecular theory and the ideal gas law to predict the behavior of gases.

Describe the basics of solution stoichiometry.

Perform calculations including concentrations, dilution and simple acid base chemistry.

Use nuclear chemistry to describe radioactive decay.

Collect, analyze and interpret experimental data from the performance of inorganic laboratory experiments.

Apply safe laboratory skills to solve problems in a cooperative environment.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

CHE 102 Introduction to Organic and Biological Chemistry
CHE 102 is a one semester course covering the fundamentals of organic and biological chemistry. It is designed to fulfill the requirements of certain allied health and nursing programs. It also is appropriate as a science elective for students who are not science, engineering, or mathematics majors. Although not a prerequisite, this course may also serve as a preparatory course for CHE 200 – Organic Chemistry I. This course is dedicated to understanding the structure, properties and chemistry of a variety of organic and biological molecules. Topics include: saturated and unsaturated hydrocarbons, organic molecules containing oxygen and sulfur, carbohydrates, carbonyl compounds, lipids, proteins, and nucleic acids.
Upon successful completion of this course, students should be able to:
Recognize and name compounds belonging to different classes of organic molecules.
Draw Fischer projections of organic molecules and identify any chiral carbons.
Predict the products of the reactions of organic molecules.
Identify carbohydrates, proteins, nucleic acids and lipids and discuss their biological importance.
Recall the structures of amino acids and identify the structural levels of proteins.
Describe the function of an enzyme, discuss factors that affect enzyme activity, and explain how inhibitors work.
Recall the structures of nucleotides and relate them to the structure of DNA and RNA.
Describe protein synthesis from DNA.
Apply safe laboratory skills to solve problems in a cooperative environment.
4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

CHE 110 General Chemistry I
This course is the first part of a rigorous, mathematics based college chemistry sequence. This course is designed for students majoring in science or engineering fields. Basic laws and theories of chemistry including: chemical bonding, chemical reactions, the mole and stoichiometry, gas laws, solution chemistry, thermochemistry, chemical periodicity and atomic structure will be covered. NOTE: A grade of C or better is required for MAT 128 to fulfill prerequisite.
Upon successful completion of this course, students should be able to:
Define chemistry as the study of matter, its properties and changes and the energy associated with these changes.
Use the metric system as a tool for performing and applying scientific measurements.
Identify and classify substances with regard to composition, state, purity, and modes of separation.
Apply the knowledge of the periodicity of the elements toward the description of chemical bonding.
Solve mathematical problems related to chemical reactions and the mole concept including solution stoichiometry.
Apply the kinetic molecular theory to account for the properties of gases and use the gas laws in calculations.
Describe and calculate heat in chemical reactions and physical processes.
Explain the relationship between the Periodic Table and Atomic Structure.
Describe chemical bonding using Lewis structures, VSEPR theory and the valence bond theory.
Collect experimental data utilizing modern chemistry laboratory techniques, problem solve and analyze the data to formulate appropriate conclusions and compile lab reports.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

CHE 111 General Chemistry II
This course is the second part of a rigorous, mathematics based college chemistry sequence. This course is designed for students majoring in science or engineering fields. Basic laws and theories of chemistry including: colligative properties, kinetics, chemical equilibrium, acid-based equilibria, solubility and complex ion equilibria, thermodynamics, oxidation-reduction reactions, electrochemistry and nuclear chemistry will be covered.
Upon successful completion of this course, students should be able to:
Describe the major types of intermolecular forces and the role they play in the properties of solids and liquids.
Describe the properties and behavior of solutions.
Perform calculations involving solution concentrations and colligative properties.
Apply the principles of kinetics to chemical systems.
Apply the principles of chemical equilibrium to chemical systems.
Evaluate and apply modern theories of acids and bases, especially the concept of pH.
Apply the concepts of solubility and complex ion formation.
Discuss and apply the fundamentals laws of thermodynamics, free energy and entropy.
Discuss and apply the principles of electrochemistry to chemical systems.
Describe the basic concepts of nuclear chemistry.
Demonstrate an ability to utilize modern chemistry laboratory techniques and equipment.
4 Credits 3 Weekly Lecture Hours
3 Weekly Lab Hours

CHE 200 Organic Chemistry I
An integrated study of carbon compounds with emphasis on structure, stereochemistry, reactions and synthesis. Laboratory work will emphasize record keeping, separation, purification and identification using chromatography.
Upon successful completion of this course, students should be able to:
Describe the chemical bonding in organic compounds.
Analyze the thermodynamic and kinetic relationship in organic reactions.
Describe the physical properties, stereochemistry, preparation, reactions and multistep synthesis of hydrocarbons.
Demonstrate laboratory procedures for record keeping, separation, purification and identification using chromatography.
5 Credits 4 Weekly Lecture Hours
3 Weekly Lab Hours

CHE 201 Organic Chemistry II
The study of organic compounds containing oxygen and nitrogen. The structure, stereochemistry, reactions, and multistep synthesis of organic nitrogen and oxygen will be studied. Syntheses and instrumental analysis (IR and NMR) will be emphasized in the laboratory.
Upon successful completion of this course, students should be able to:
Analyze organic compounds using spectroscopy.
Explain elimination and substitution reactions.
Describe the physical properties, stereochemistry, preparation, reactions and multistep synthesis of organic oxygen and nitrogen compounds.
Describe the general characteristics of carbohydrates, lipids and proteins.
Prepare compounds using complex syntheses.
Demonstrate a knowledge of scientific references and an ability to search the scientific literature.
5 Credits 4 Weekly Lecture Hours
3 Weekly Lab Hours

EGR - Engineering

EGR 100 Engineering Graphics
The fundamentals of drafting, space geometry of points, lines and surfaces, graphs, graphical mathematics and design projects.
Upon successful completion of this course, students should be able to:
Reduce concepts and configurations to freehand sketches.
Construct orthographic drawings using drafting standards, conventions and instruments.
Construct pictorial and axonometric instrument drawings.
Solve descriptive geometry problems.
Apply the principles of graphic mathematics to scales, graphs, nomographs, empirical equations and graphical calculus.
Create and plot computer-aided drawings.
Solve individual and group preliminary design projects.
3 Credits 2 Weekly Lecture Hours
2 Weekly Lab Hours

EGR 150 Engineering Topics
This course is a required series of eight seminars designed to introduce first year engineering students to skills and topics of importance in engineering and is taken in the second semester of the engineering curriculum. Presented by both DCCC faculty/staff and invited speakers, the weekly one-hour seminars cover technical writing and communication, research design, error analysis and internet research, along with presentations by practicing mechanical, chemical, electrical and computer engineers.
Upon successful completion of this course, students should be able to:
Use the Internet as a research tool in engineering.
Write a concise and accurate technical abstract on an engineering topic in an appropriate style.
Propose a research design for a specific engineering problem.
Explain how error analysis may be applied to a specific engineering problem.
Discuss the role of engineers in the current and future economic and technological environment.
Describe the technical areas in which practicing engineers work.
Clarify general or specific career goals in engineering.
1 Credit 1 Weekly Lecture Hour

EGR 200 Engineering Statics
A vector mechanics study of forces acting on static particles and rigid bodies. Equilibrium of rigid bodies, distributed body forces acting on centroid, centers of gravity and moments of inertia, analysis of structures, forces in beams and cables, friction and virtual work are topics covered.
Upon successful completion of this course, students should be able to:
Resolve forces acting in plane and space configurations.
Develop equivalent-force systems by means of vector, dot, cross, and triple products.
Solve equilibrium problems on two- and three-dimensional bodies.
Determine the effect of distributed forces on bodies in terms of center of gravity and moment of inertia.
Analyze the internal forces on structures such as trusses, frames, machines, beams, and cables.
Investigate the friction between moving components on mechanisms such as wedges, screws, bearings, wheels, and belts.
Use the method of virtual work to solve for forces, mechanical efficiency, potential energy, equilibrium, and stability.
3 Credits 3 Weekly Lecture Hours

EGR 201 Engineering Dynamics
A course in vector dynamics. Topics include the kinematics and kinetics of particles and rigid bodies in plane and three-dimensional motion. Force, energy, and momentum methods, as well as the study of unidirectional vibrations are covered.
Upon successful completion of this course, students should be able to:
Analyze the kinematics of particles and rigid bodies for unidirectional, bidirectional, and general motion.
Develop the kinetics of particles and rigid bodies in terms of force, energy, and momentum for unidirectional, bidirectional, and general motion.
Determine the motion of single particles and rigid bodies in one-dimensional vibrating or oscillating systems.
3 Credits 3 Weekly Lecture Hours

EGR 210 Engineering Circuits
A first course in circuits for engineers. Uses the basic concepts of modern circuit analysis. Topics include two-terminal devices and their classification, circuit topology and Kirchoff's Laws, lumped-circuit analysis using matrix algebra, controlled and independent sources, power and energy, and second-order time-domain techniques (including singularity functions, convolution and introductory state-variable techniques). Theory will be illustrated by laboratory and class assignments.
Upon successful completion of this course, students should be able to:
Set up and solve circuit problems using mesh analysis.
Set up and solve circuit problems using nodal analysis.
Set up and solve for the transient response of first-order and second-order circuits.
Set up and solve for the general solution of first-order and second-order circuits.
Find the initial conditions of first-order and second-order circuits.
Use instruments (DMM, power supplies, function generators, oscilloscopes) to measure various electrical quantities.
Find the impulse response of electrical circuits.
Find the response to a given input of an electrical circuit using convolution.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

EGR 220 Engineering Thermodynamics
Engineering Thermodynamics is an introductory one-semester course with lecture and demonstrations designed for engineering and science students. Major topics include: concepts of thermodynamics; pressure; temperature; heat and heat transfer; properties of substances; density; extensive and intensive properties; First Law of Thermodynamics and its application; Second Law of Thermodynamics and its application; reversible and irreversible processes; the Clausius, Kelvin, and Planck statements of the Second Law; entropy and Carnot, Otto, Diesel, and Rankine cycles; power cycles and the refrigeration cycle.
Upon successful completion of this course, students should be able to:
Understand the basic concepts and definitions needed to apply the laws of thermodynamics.
Describe the properties and behavior of a pure substance.
Develop the First Law of Thermodynamics and apply it to control volume problems.
State the Second Law of Thermodynamics and describe its significance to the analysis of cycles and processes.
Understand the concept of entropy and its relationship to the Second Law of Thermodynamics.
Analyze the operation of power and refrigeration systems.
3 Credits 3 Weekly Lecture Hours

ESS - Earth & Space Science

ESS 100 Earth Science

This course is a general survey of geology, meteorology, oceanography, and astronomy in the context of natural hazards and disasters. There is an emphasis on understanding, predicting, avoiding, and preventing these disasters. The course is intended for non-science majors interested in the earth sciences and how they relate to human activity.

Upon successful completion of this course, students should be able to:
Analyze efforts to minimize the effects of natural hazards.
Explore how scientific evaluation can assess the dangers posed by natural processes through observation and risk analysis.
Explain the underlying geologic and atmospheric processes responsible for natural hazards such as volcanic eruptions, earthquakes, floods, and hurricanes.
Identify areas susceptible to natural hazards and infer which hazards have the potential to become natural disasters or catastrophes as a result of geographic or anthropogenic factors.
Develop an appreciation of the significance of natural hazard events through the application of natural hazard case studies.
Demonstrate techniques for solving problems in a collaborative, technology-rich laboratory environment.
College Academic Learning Goal Designation: Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

ESS 105 Astronomy

This course is designed to introduce students to the science of astronomy, its history, and its importance as an influence on our view of humankind. Students will conduct astronomical observations using software, telescopes, and star charts to study objects in the night sky. Practical observational activities are designed to foster a conceptual understanding of how objects from great distances are studied from the earth. The course is intended for non-science majors.

Upon successful completion of this course, students should be able to:
Explain what tools and methods are used by astronomers to make observations and gather information about the universe.
Describe the contributions made by early astronomers, and how it led to the current view of our universe.
Demonstrate an understanding of the origins, structure, and evolution of our solar system, stars, galaxies and the universe.
Investigate the possibility of life existing elsewhere in the universe.
Use star charts and/or planetarium software to survey the night sky and discover various celestial objects.
Use problem solving techniques to analyze and interpret data from student observations and/or astronomical observatories.
College Academic Learning Goal Designation: Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

ESS 110 Physical Geology

This course is designed for Geology and Natural Science majors program although it will be appropriate for non-science majors as a laboratory science elective. This course, designed as a laboratory course provides a study of the Earth, its composition, structure and the processes that shape it. The course will consider the various aspects of geology including, earthquakes, volcanoes, surface and groundwater, rivers and streams, caves, landform development, plate tectonics, rocks, and minerals.

Upon successful completion of this course, students should be able to:
Identify volcanism, igneous activity, and the formation of igneous rocks.
Describe the processes of weathering, erosion, sedimentation and the formation of sedimentary rocks.
Explain the basic ideas of metamorphism and the formation of metamorphic rocks.
Define the mechanism and effects of earthquakes.
Summarize the theory of plate tectonics.
Apply the plate tectonic theory to mountain building, volcanism and earthquakes.
Compare surface water and groundwater and explain the role of each in the human environment.
Climate, glaciers, wind, and coastal processes.
Geologic time and rock correlation.
Describe the socioeconomic impact of geology.
College Academic Learning Goal Designation: Scientific Reasoning (SI)

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

ESS 112 Historical Geology

Historical Geology is the study of the Earth's origin and changing dynamics including the physical, chemical and biological processes. In a laboratory setting, students will explore the rock layers, fossil records and current geological processes. Student will gain an understanding of the interpretation of the Earth's Geologic history.

Upon successful completion of this course, students should be able to:
Discuss the concepts of geologic and apply to rock correlation.
Apply the concepts of stratigraphy as related to geologic time.
Describe the fundamental processes of sedimentary environments.
Understand the current thoughts of the origin and diversity of life.
Summarize the general theory of the evolution of flora and fauna.
Understand the Precambrian life and earth history.
Understand the late Paleozoic life and earth history.
Understand the Mesozoic life and earth history.
Understand the Cenozoic life and earth history.
Summarize the concepts and current thoughts of primate and human evolution.

4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

MAT - Mathematics

MAT 025 Arithmetic Review
This course is designed for students who wish to strengthen their basic arithmetic skills. Arithmetic topics include addition, subtraction, and multiplication facts, addition and subtraction of whole numbers, multiplication and division of whole numbers, and rounding of whole numbers. Students will strengthen their skills during their required class sessions using interactive computer software combined with personalized, on-demand assistance.
Upon successful completion of this course, students should be able to:
Add and subtract single digit whole numbers.
Multiply and divide single digit whole numbers.
Add and subtract whole numbers.
Multiply and divide whole numbers.
Round whole numbers.
0 Credits

MAT 050 Mathematics Review
This course is designed for students who wish to strengthen their arithmetic skills and introductory algebra skills. Arithmetic topics include fractions, mixed numbers, decimals, ratio and proportion, percent, and real numbers. Introductory algebra topics include linear equations, linear inequalities, graphing linear equations, and polynomials.
Upon successful completion of this course, students should be able to:
Reduce, add, subtract, multiply, and divide fractions.
Write in words or numerals, add, subtract, multiply, divide and round decimals.
Convert fractions, decimals, and percents.
Solve problems using ratios, proportions, and percents.
Evaluate, translate, and simplify algebraic expressions and use properties to add, subtract, multiply, and divide real numbers.
Solve linear equations and inequalities in one variable.
Graph linear equations in two variables.
Add, subtract, multiply, and divide polynomials.
3 Credits 3 Weekly Lecture Hours

MAT 120 Modern College Mathematics
This course is designed to give students in the non-science fields an appreciation of and experience in using problems solving techniques, deductive and inductive reasoning, logical reasoning and symbolic logic to solve problems in a variety of disciplines. It also gives students an overview of the history of the number systems of various cultures, and reviews and reinforces the use of Algebra to solve problems in different fields of study OR uses ratios, proportions and percents to solve consumer-related problems.
Upon successful completion of this course, students should be able to:
Use the notation and operations of set theory.
Use inductive and deductive reasoning and symbolic logic as appropriate to draw a logical conclusion from given information.
Represent numbers from different number systems and add, subtract, multiply and divide in numeration systems other than base ten.
Plus, two of the following three competencies: Analyze the real-number system and apply it to real world problems.
Solve linear equations and inequalities using algebraic and graphic techniques, and apply those techniques to real world problems.
Use ratios, proportions, and percents to solve consumer-related problems.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
3 Credits 3 Weekly Lecture Hours

MAT 121 Introduction to Probability and Statistics
This course provides a solid introduction to probability theory and its applications as well as the visual and mathematical analysis of data and data distributions. This course is similar to Modern College Mathematics (MAT 120) in design and can be used as mathematics elective for students who are not science, engineering, or mathematics majors. It may be taken before Modern College Mathematics. It also serves as a prerequisite for MAT 210.
Upon successful completion of this course, students should be able to:
Apply techniques and formulas to solve problems involving the fundamental counting principle, permutations and combinations.
Use the definitions, axioms, and theorems of probability to solve problems.
Use statistical measures, graphs, and normality to organize, describe, visually represent, and analyze data.
Solve problems involving the simple linear regression line model and the correlation coefficient.
Use a software package to solve problems in the competencies covered.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
3 Credits 3 Weekly Lecture Hours

MAT 125 Mathematics for Teachers of Children I
This course emphasizes both the clear understanding of mathematical ideas and especially the ability to communicate these ideas to elementary school children. Using various mathematical models this course covers the following topics: sets, whole numbers, numeration, estimation, number theory, fractions, decimals, integers and proportion. This course is designed primarily for students pursuing Early Childhood Education (Pre-K-4th grade) or Middle grades (4-8th grade) teacher certification, but may be elected by other education majors.
Upon successful completion of this course, students should be able to:
Utilize the key mathematical processes of communicating, reasoning, solving problems and making connections with mathematics and real world problems, and making connections among the various mathematical systems: whole numbers, integers, and rational numbers (fractions).
Demonstrate an understanding of structure, properties and operations in the whole number system.
Utilize mental computation and estimation techniques.
Demonstrate an understanding of basic number theory concepts and processes.
Demonstrate an understanding of structure, properties and operations in the system of integers.
Demonstrate an understanding of properties and operations with fractions.
Solve problems using ratios, proportions and percents.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
3 Credits 3 Weekly Lecture Hours

MAT 126 Mathematics for Teachers of Children II
As a continuation of Mathematics for Teachers I, this course is designed primarily for students pursuing Early Childhood Education (Pre-K - 4th grade) or Middle grades (4-8th grade) teacher certification, but may be elected by other education majors. The course emphasizes both the clear understanding of mathematical ideas and the ability to communicate these ideas to elementary school children. Topics include data analysis, probability, measurement and geometry in two and three dimensions.
Upon successful completion of this course, students should be able to:
Collect, organize, analyze and interpret statistical data.
Solve probability problems.
Use geometric shapes and patterns to describe real world phenomena.
Demonstrate an understanding of the concept of measurement.
Use triangle congruence and similarity.
Analyze lines and circles using coordinate geometry.
Use transformations to solve geometric problems.
3 Credits 3 Weekly Lecture Hours

MAT 128 Algebra
This course is designed primarily as a preparatory course for students intending to take College Algebra or Business Precalculus. Topics covered in this course include linear equations and inequalities; quadratic equations; introduction to functions and their graphs; 2x2 linear systems; polynomials; rational expressions and equations; and radical expressions and equations.
Upon successful completion of this course, students should be able to:
Solve linear equations and inequalities.
Solve problems involving functions and their graphs.
Solve problems involving linear systems.
Perform basic operations on polynomials and factor polynomials.
Simplify and perform basic operations on rational expressions and solve rational equations.
Simplify and perform basic operations on radical expressions and solve radical equations.
Solve quadratic equations.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
4 Credits 4 Weekly Lecture Hours

MAT 135 Business Precalculus
This course is designed primarily (but not exclusively) for Business Majors. Topics include graphing and solving problems using linear, quadratic, rational, square root, log, and exponential functions, solving systems of equations, performing operations on matrices, linear programming, and applications from business and economics.
Upon successful completion of this course, students should be able to:
Graph and solve problems using linear, quadratic, polynomial, rational, and square root functions.
Graph and solve problems involving the log and exponential functions.
Perform operations on matrices.
Find the optimal solution of a linear programming problem using the graphing method of two variables.
Apply the mathematical properties of lines, matrices, and exponential and log functions to business and economic problems.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
3 Credits 3 Weekly Lecture Hours

MAT 136 Business Calculus
This course is designed primarily (but not exclusively) for Business majors. Topics include limits, differentiation, and integration. Applications include maxima-minima and problems in management and economics.
Upon successful completion of this course, students should be able to:
Calculate the derivatives of certain algebraic functions, and products, quotients, and compositions of such functions.
Apply the concepts of calculus to optimization problems and consumer and producer surplus.
Calculate the derivatives of exponential and logarithmic functions.
Integrate exponential, certain algebraic functions, and some combinations of these functions using substitution.
3 Credits 3 Weekly Lecture Hours

MAT 151 College Algebra
This course is intended primarily for those students who are majoring in science, engineering, or mathematics. Together with Precalculus, it prepares students for Calculus I. Topics covered include solving equations (linear, quadratic, radical, polynomial, rational, and absolute value), solving inequalities (linear, polynomial, rational, and absolute value), operations in the Rectangular Coordinate System and the Complex Number System, basic function operations (domain, range, graphing, arithmetic, composition and inverses), and functions (linear, quadratic, polynomial, rational, exponential and logarithmic).
Upon successful completion of this course, students should be able to:
Perform operations in the Complex Number System.
Solve equations and inequalities.
Perform operations in the Rectangle Coordinate System.
Define, evaluate, perform operations and graph functions.
Analyze polynomial functions.
Analyze rational functions.
Analyze exponential and logarithmic functions.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
4 Credits 4 Weekly Lecture Hours

MAT 152 Precalculus
This course is intended primarily for those students who are majoring in science, engineering, or mathematics. Together with College Algebra, it prepares students for Calculus I. Topics covered include trigonometric functions, analytic trigonometry, triangle applications of trigonometric functions, analytic geometry, systems of equations, and sequences and series. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Analyze trigonometric functions.
Apply analytic trigonometry.
Use trigonometric functions to solve applied problems.
Apply analytic geometry.
Solve systems of equations.
Analyze sequences and series.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
4 Credits 4 Weekly Lecture Hours

MAT 160 Calculus I
This course is designed for students in the fields of science and engineering. It includes the concept of limit, the rate of change of a function, derivatives, limits of sums, integrals, and applications of differentiation. It is a required course for students majoring in engineering and may be elected by students in Liberal Arts, Business Administration, and Natural Science. It serves as a prerequisite for further mathematics courses and the University Physics sequence. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Use the concept of limit.
Differentiate functions.
Use differential calculus to sketch curves and to solve applied problems.
Integrate functions by approximation and by use of the antiderivative.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

MAT 161 Calculus II
This course is a continuation of Calculus I, MAT 160, and is designed for students in the fields of mathematics, science and engineering. It includes inverse trigonometric functions, applications of integration, methods of integration, improper integrals, conic sections, parametric equations, polar coordinates, and infinite series. Calculus II is an appropriate math selection for students interested in STEM careers and may also be applied to most other majors. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Differentiate and integrate inverse functions.
Use integral calculus to determine area and volume and to solve applied problems.
Integrate functions using different techniques.
Relate functional and geometric properties of conic sections, curves given in parametric form, and polar curves.
Test infinite series for convergence or divergence.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

MAT 200 Linear Algebra
This course is designed primarily for engineering, computer science and math students planning to transfer to four-year institutions. The topics include systems of linear equations, matrices, determinants, vectors, vector spaces, linear transformations, eigenvalues and applications.
Upon successful completion of this course, students should be able to:
Perform matrix operations including addition, multiplication and finding the inverse.
Solve systems of linear equations using matrix methods.
Find the value of determinants using the methods of cofactors.
Solve systems of linear equations using determinants and Cramer's Rule.
Perform vector arithmetic in two space and three space.
Determine whether a set with the operations of addition and scalar multiplication forms a vector space.
Determine a basis for a vector space.
Use linear transformations to map vectors from one vector space into another.
Find the eigenvalues of a matrix.
Apply linear algebra to the solution of problems in mathematics.
3 Credits 3 Weekly Lecture Hours

MAT 210 Statistics
This course is designed to give students a tool as well as a language in which they can better understand and analyze the data with which they work and make decisions based on their analyses. It will employ algebra in deriving measures of central tendency and variability for various discrete and continuous distributions and will include the study of the following additional topics: descriptive statistics, inferential statistics, The Central Limit Theorem, the Normal Distribution and its applications, sampling distributions, hypotheses testing, interval and point estimations of population parameters, the Chi-square test with contingency tables, linear correlation and regression, analysis of variance, non-parametric statistics, and applications of statistics in various disciplines. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Recognize the role of statistics in critical thinking and its applications using descriptive and inferential statistics.
Use statistical measures of central tendency and statistical measures of variability to describe, represent and analyze data.
Solve problems with bivariate data using scatter diagrams, correlation, and Least-Squares Regression.
Solve problems involving the Normal Probability Distribution.
Solve problems involving sampling distributions.
Solve problems in statistical inference concerned with confidence intervals, minimum sample size determination, goodness of fit tests, and tests for independence and homogeneity.
Test hypotheses for one, two, and three or more samples.
Compute and interpret nonparametric tests.
Use a software package to solve problems in the competencies covered.
College Academic Learning Goal Designation: Quantitative Reasoning (QR)
3 Credits 3 Weekly Lecture Hours

MAT 230 Foundations of Discrete Mathematics
This course is designed to introduce students to the concepts involved in mathematical proofs. Topics covered include the use of logic, quantifiers, set theory, relations and functions, and proof techniques and applications. This course is intended for mathematics and some computer science majors. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Use the basic concepts of symbolic logic.
Work with quantifiers.
Apply the basic principles of set theory.
Recognize and use valid proof techniques.
Recognize and use the properties of relations and functions.
Apply proof techniques.
3 Credits 3 Weekly Lecture Hours

MAT 260 Calculus III
This course is a continuation of Calculus II, MAT 161, and is designed for students in the fields of mathematics, science and engineering. It includes vectors in two- and three-dimensional space, vector-valued functions, partial differentiation, multiple integration, and vector analysis. Calculus III is an appropriate math selection for students interested in STEM careers and may also be applied to most other majors. NOTE: Pre-requisite requires a grade of 'C' or higher.
Upon successful completion of this course, students should be able to:
Use vectors to solve 2-space and 3-space geometrical problems.
Use vector-valued functions to describe motion in space.
Find partial derivatives of functions of two or more variables.
Use partial differentiation to solve applied problems.
Evaluate multiple integrals.
Use multiple integrals to solve applied problems.
Use techniques of vector analysis.
4 Credits 4 Weekly Lecture Hours

MAT 261 Differential Equations
This course is designed for students in the fields of science and engineering. It includes first-order differential equations, linear higher-order differential equations, applications, systems of equations, Laplace transformation, series and approximate solutions. It is a required course for students majoring in engineering and may be elected by students in Liberal Arts, Business Administration and Science.
Upon successful completion of this course, students should be able to:
Solve first-order differential equations.
Solve linear higher order differential equations.
Use differential equations to solve applied problems.
Solve systems of differential equations.
Use Laplace transformations to solve differential equations.
Solve differential equations by use of series.
Find approximate solutions by use of numerical methods.
3 Credits 3 Weekly Lecture Hours

PHY - Physics

PHY 107 Technical Physics
Technical Physics is an algebra-based course designed primarily for students in the technologies. The course explores selected topics related to mechanics, sound, electricity, and magnetism, with an emphasis on technical applications of physics.
Upon successful completion of this course, students should be able to:
Identify the common units of mass, length, and time in both the English and metric systems and the derived units necessary for the calculations and measurements of the physical phenomena studied in this course.
Describe the motion of simple objects in terms of distance, time, velocity, and acceleration.
Analyze motion using Newton's Laws in one and two dimensions.
Apply the Laws of Conversation of Momentum and Energy.
Apply mechanics to rotating systems.
Describe the nature of wave motion and apply it to sound waves.
Analyze electrostatic forces and related electrical concepts.
Explain the fundamentals of magnetism.
Apply the topics listed above to understand the functioning of simple machines and electrical devices.
Apply laboratory skills and technologies to solve problems in a cooperative environment.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

PHY 110 College Physics I
This is a course designed for science majors who are not in the calculus sequence. The course content consists of Mechanics and Thermodynamics.
Upon successful completion of this course, students should be able to:
Describe motion in one dimension.
Apply vector mathematics to explain two-dimensional motion.
Describe and analyze freely-falling objects.
Analyze motion using Newton's Laws.
Apply conservation laws.
Describe rotational motion.
Analyze oscillatory motion.
Describe and apply the basic concepts of thermodynamics.
Apply laboratory skills and computer-based technologies to solve problems in a cooperative environment.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

PHY 111 College Physics II
This course is a continuation of College Physics I and is designed for Science majors who are not in the University Physics sequence. The course deals primarily with Electricity and Magnetism, Waves and Optics, and Modern Physics topics.
Upon successful completion of this course, students should be able to:
Describe electrostatic interactions in terms of force, fields, energy and potential.
Analyze circuits using Ohm's Law and Kirchhoff's Rules.
Describe the magnetic fields of simple geometries and their interactions with charged objects.
Define waves and their interactions.
Apply wave concepts to explain sound phenomena.
Apply the concepts of geometric and wave optics to the phenomena of refraction, reflection, interference and diffraction.
Discuss the development of the atomic model and quantum mechanics.
Use concepts of nuclear physics to describe decay processes.
Apply laboratory skills and computer technology to solve problems in a cooperative environment.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

PHY 131 University Physics I
This course is designed for Natural Science and Engineering majors who are required to take a calculus-based physics course. Dealing primarily with mechanics, the course covers the linear and rotational kinematics and dynamics of and the principles, laws and concepts pertaining to, the motion of solids, along with specific applications relating to liquids and gases.
Upon successful completion of this course, students should be able to:
Apply the kinematics equations to determine the linear motion of a particle.
Use the kinematics equations to determine the rotational motion of a solid.
Apply Newton's Laws of motion and gravity to the linear motion of a particle.
Apply Newton's Laws of motion to the rotational motion of a solid.
Know and apply the concepts of work and energy to solids, liquids and gases.

Utilize the concepts of momentum and conservation of momentum principle to analyze the interactions of particles and solids.
Use the concepts relating to the material properties of solids, liquids and gases.
Apply the concepts of periodic motion to solids experiencing simple harmonic motion.
Develop and use the kinematics and dynamics equations for wave motion as exhibited by liquids and gases.
Apply laboratory skills and computer technology to solve problems in a cooperative environment.
College Academic Learning Goal Designation: Scientific Reasoning (SI)
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

PHY 132 University Physics II
This course is a continuation of University Physics I and is designed for Natural Science and Engineering majors who are required to take a calculus-based physics course sequence. Dealing primarily with electricity and magnetism, the course covers the principles, laws and concepts of electrostatics and electrodynamics, including electromagnetic waves and physical and geometrical optics.
Upon successful completion of this course, students should be able to:
Determine the electric field by the application of Coulomb's Law and Gauss's Law.
Apply the concepts of potential difference, capacitance and resistance to direct and alternating current circuits.
Utilize Kirchhoff's Rules to analyze direct and alternating current circuits.
Calculate magnetic fields by the application of the Biot-Savart Law and Ampere's Law.
Apply Faraday's Law of Induction to explain the effects resulting from changing magnetic fields.
Use Maxwell's Equations to explain the creation and properties of an electromagnetic wave.
Apply the concepts of geometric and wave optics to the phenomena of refraction, reflection, interference and diffraction.
Apply laboratory skills and computer technology to solve problems in a cooperative environment.
4 Credits 3 Weekly Lecture Hours
2 Weekly Lab Hours

PHY 230 Modern Physics
This course is an introduction to topics in Modern Physics. Students will be introduced to Special Relativity, Wave-Particle Duality, Quantum Mechanics, Atomic physics, Nuclear physics, Particle Physics and Cosmology. This course is intended for students intending to major in physics and for students who need an extra course in Modern Physics.
Upon successful completion of this course, students should be able to:
Apply the concept of relativity to the physical world.
Discuss the concept of Wave-Particle Duality and Quantum Physics and its implications.
Describe the structure of matter as described by Atomic and Molecular physics.
Describe and explain physics at the nuclear level.
Describe the fundamental particles found in nature and their role in cosmology.
3 Credits 3 Weekly Lecture Hours

SCI - Science

SCI 105 Introduction to Nanotechnology
This course will cover the application of nanotechnology to electronic, chemical, and biological fields including a review of the basic science concepts. The impact of the commercialization of nanotechnology on society and the environment will be discussed. It is intended primarily for students in any of the various technology programs who will seek employment as laboratory technicians in research and industrial laboratories. Emphasis will be placed on providing a broad overview of the field.
Upon successful completion of this course, students should be able to:
Demonstrate an understanding of scientific notation and size relationships between nanometers and other metric measures.
Describe the societal impacts of nanotechnology on modern society.
List at least five biological applications of nanotechnology.
Find, using Internet research, five commercial applications of nanotechnology.
Describe the structures known as nanotubes and bucky balls, and one current application of each form.
Describe the application of nanotechnology in environmental and medical sensors to electronic monitoring.
Define key nanotechnology concepts such as "buttom-up", "self-assembly", and "molecular recognition".
Discuss instrumentation, such as SEM and STM, which is used at the nano level.
Hypothesize future applications of nanotechnology.
3 Credits 3 Weekly Lecture Hours

SCI 110 History of Science
This course, designed as a non-laboratory science option for non-science majors or as an open elective for Natural Science majors, traces the philosophical, cultural, intellectual, and technological developments that influenced the evolution of modern science. By examining these developments made over a span of two millennia, students in the course identify the people, places, ideas, and discoveries that led to fundamental shifts in worldviews resulting in changes in the way people obtain knowledge about, investigate, and understand the physical world. Specifically, the course explores the origin and influence of scientific methodologies by tracing the changing role of experimenters, their experiments, and the tools they used. In addition, students document the converging influences that resulted in the Scientific Renaissance and the Scientific Revolution. The course concludes by highlighting important scientific discoveries up to the present day and the continuing struggle between science and long-held misconceptions and beliefs.
Upon successful completion of this course, students should be able to:
Develop an answer to the question "What is science?", state the basic assumptions underlying modern science, and discuss the origins of these assumptions.
Define "scientific paradigm", describe its influence on the development of science, and outline the factors that result in a change of the scientific paradigm.
List the characteristics of a scientific methodology.
Understand the role politics, religion, and commerce played in the history of science.
Explain the difference between deductive and inductive arguments and their role in the study of the physical world, identify people who employed them, and give examples of each form.
Describe the approaches and contributions to science of Greek, Islamic, Chinese, Indian, and European thinkers and identify the people and places associated with these approaches and contributions.
Outline the changing role of experimentation in the history of science, the tools used in the experiments, and describe their influence on the origin of scientific methodology.
List examples and relate the significance of the people, places, ideas, and discoveries that were part of the Scientific Renaissance.
Describe the emergence of the Scientific Revolution from the Scientific Renaissance and provide examples of important scientific discoveries over the past three hundred years.
Identify current areas where scientific research is in conflict with popular beliefs and analyze a selected conflict by examining all arguments put forth in the context of the scientific method and the history of science.
3 Credits 3 Weekly Lecture Hours

SCI 150 STEM Topics
STEM Topics is a 1-credit course designed to introduce students majoring in STEM fields to skills and topics of importance to Science, Technology, Engineering, and Mathematics. Presented by both Delaware County Community College faculty/staff and invited speakers, the weekly one-hour meetings include explorations of STEM-related transfer programs and careers, internet research methods, identification of primary research, research design, and technical writing and communication.
Upon successful completion of this course, students should be able to:
Use the internet as a research tool in STEM disciplines.
Evaluate internet sources for credibility and authority in STEM disciplines.
Differentiate between primary and secondary research in STEM disciplines.
Produce and present a research design to address a proposed hypothesis.
Identify potential STEM transfer programs based on students' interest areas.
Develop career goals in a chosen STEM field.
1 Credit 1 Weekly Lecture Hour

STEM - Science, Technology, Engineering and Math Internships

STEM 190 STEM Internship (1 credit)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE: To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their STEM major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
1 Credit 1 Weekly Lecture Hour

STEM 194 STEM Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE: Prerequisites: To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their STEM major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
2 Credits 2 Weekly Lecture Hours

STEM 199 STEM Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded. NOTE: Prerequisites: To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their STEM major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Demonstrate specifically how job-related competence has improved.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
3 Credits 3 Weekly Lecture Hours