2011 Tuning Oversight Council for Engineering and Science

Course Descriptions and Student Learning Outcomes Proposed for the Academic Course Guide Manual

Lower-Division Courses Currently in the Academic Course Guide Manual

Texas Common Course Number	Course Name	Tuning Committee(s) Proposing for Fine-Tuning
BIOL 1306/1106	Biology for Science Majors I (lecture and lab)	Biology Biomedical Engineering
BIOL 1307/1107	Biology for Science Majors II (lecture and lab)	Biology
BIOL 1308/1108	Biology for Non-Science Majors I	Biology (to appropriately align BIOL 1306/1106)
BIOL 1309/1109	Biology for Non-Science Majors II	Biology (to appropriately align BIOL 1307/1107)
BIOL 1311/1111	General Botany (lecture and lab)	Biology
BIOL 1313/1113	General Zoology (lecture and lab)	Biology
BIOL 2321/2121	Microbiology for Science Majors (lecture and lab)	Biology
CHEM 2323/2123	Organic Chemistry I (lecture and lab)	Chemistry Biology Biomedical Engineering Chemical Engineering
CHEM 2325/2125	Organic Chemistry II (lecture and lab)	Chemistry Biology Chemical Engineering
COSC 1336/1436	Programming Fundamentals I	Biomedical Engineering Chemical Engineering
ENGR 2304	Programming for Engineers	Biomedical Engineering Chemical Engineering
PHYS 1301/1101	College Physics I (lecture and lab)	Biology
PHYS 1302/1102	College Physics II (lecture and lab)	THECB (to complete the two-semester course series)

Lower-Division Courses Proposed and Accepted for the Academic Course Guide Manual, Fall 2012

Texas Common Course Number	Course Name	Tuning Committee(s) Proposing for Fine-Tuning
ENGR 2333	Elementary Chemical Engineering	Chemical Engineering
ENGR 2334	Chemical Engineering Thermodynamics I	Chemical Engineering

Course Title: Biology for Science Majors I
Common Course Number: BIOL 1306

Draft Course Description	Fundamental principles of living organisms will be studied, including physical and chemical properties of life, organization, function, evolutionary adaptation, and classification. Concepts of cytology, reproduction, genetics, and scientific reasoning are included. Recommended co-requisite: BIOL 1106 – Biology for Science Majors I Laboratory Recommended prerequisite: MATH 1314 – Successful completion of College Algebra or concurrent enrollment in higher-level mathematics is recommended.
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Describe the characteristics of life. 2. Explain the reasoning used by scientists. 3. Identify the basic requirements of life and the properties of the major molecules needed for life. Compare and contrast the structures, reproduction, and characteristics of viruses, prokaryotic cells, and eukaryotic cells. 4. Describe the structure of cell membranes and the movement of molecules across a membrane. 5. Identify the substrates, products, and important chemical pathways in metabolism. 6. Identify the principles of inheritance and solve classical genetic problems. 7. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 8. Describe the unity and diversity of life and the evidence for evolution through natural selection.

Course Title: Biology for Science Majors I Laboratory
Common Course Number: BIOL 1106

Draft Course Description	This laboratory-based course accompanies Biology 1306, Biology for Science Majors I. Laboratory activities will reinforce the fundamental principles of living organisms, including physical and chemical properties of life, organization, function, evolutionary adaptation, and classification. Study and examination of the concepts of cytology, reproduction, genetics, and scientific reasoning are included. Pre-/Co-requisite: BIOL 1306 – Biology for Science Majors I
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Describe the characteristics of life. 5. Explain the reasoning used by scientists. 6. Identify the basic properties of substances needed for life. 7. Compare and contrast the structures, reproduction, and characteristics of viruses, prokaryotic cells, and eukaryotic cells. 8. Describe the structure of cell membranes and the movement of molecules across a membrane. 9. Identify the substrates, products, and important chemical pathways in metabolism. 10. Identify the principles of inheritance and solve classical genetic problems. 11. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 12. Describe the unity and diversity of life and the evidence for evolution through natural selection.

Course Title: Biology for Science Majors II
Common Course Number: BIOL 1307

Draft Course Description	The diversity and classification of life will be studied, including animals, plants, protists, fungi, and prokaryotes. Special emphasis will be given to anatomy, physiology, ecology, and evolution of plants and animals. Recommended co-requisite: BIOL 1107 – Biology for Science Majors II Laboratory Recommended prerequisite: MATH 1314 – Successful completion of College Algebra or concurrent enrollment in higher-level mathematics is recommended. Prerequisites: Approval of the Instructor Note: It is recommended that BIOL 1306 Biology for Science Majors I and BIOL 1106 Biology for Science Majors I Laboratory, or BIOL 1406 Biology for Science Majors I (Lecture and Laboratory) be taken before BIOL 1307/1107 or BIOL 1407.
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Describe modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation. 2. Describe phylogenetic relationships and classification schemes. 3. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 4. Describe basic animal physiology and homeostasis as maintained by organ systems. 5. Compare different sexual and asexual life cycles noting their adaptive advantages. 6. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.

Course Title: Biology for Science Majors II Laboratory
Common Course Number: BIOL 1107

Draft Course Description	This laboratory-based course accompanies Biology 1307, Biology for Science Majors II. Laboratory activities will reinforce study of the diversity and classification of life, including animals, plants, protists, fungi, and prokaryotes. Special emphasis will be given to anatomy, physiology, ecology, and evolution of plants and animals. Pre-/Co-requisite: BIOL 1307 – Biology for Science Majors II
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Demonstrate knowledge of modern evolutionary synthesis, natural selection population genetics, micro and macroevolution, and speciation. 5. Distinguish between phylogenetic relationships and classification schemes. 6. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 7. Describe basic animal physiology and homeostasis as maintained by organ systems. 8. Compare different sexual and asexual life cycles noting their adaptive advantages. 9. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.

Course Title: Biology for Non-Science Majors I
Common Course Number: BIOL 1308

Draft Course Description	Provides a survey of biological principles with an emphasis on humans, including chemistry of life, cells, structure, function, and reproduction. THIS COURSE IS NOT INTENDED FOR SCIENCE MAJORS. Recommended co-requisite: BIOL 1108 – Biology for Non-Science Majors I Laboratory
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Distinguish between prokaryotic, eukaryotic, plant and animal cells, and identify major cell structures. 2. Identify stages of the cell cycle, mitosis (plant and animal), and meiosis. 3. Interpret results from cell physiology experiments involving movement across membranes, enzymes, photosynthesis, and cellular respiration. 4. Apply genetic principles to predict the outcome of genetic crosses and statistically analyze results. 5. Describe karyotyping, pedigrees, and biotechnology and provide an example of the uses of each. 6. Identify parts of a DNA molecule, and describe replication, transcription, and translation. 7. Analyze evidence for evolution and natural selection.

Course Title: Biology for Non-Science Majors I Laboratory
Common Course Number: BIOL 1108

Draft Course Description	This laboratory-based course accompanies BIOL 1308, Biology for Non-Science Majors I. Laboratory activities will reinforce a survey of biological principles with an emphasis on humans, including chemistry of life, cells, structure, function, and reproduction. Pre-/Co-requisite: BIOL 1308 – Biology for Non-Science Majors I
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Distinguish between prokaryotic, eukaryotic, plant and animal cells, and identify major cell structures. 5. Identify stages of the cell cycle, mitosis (plant and animal), and meiosis. 6. Interpret results from cell physiology experiments involving movement across membranes, enzymes, photosynthesis, and cellular respiration. 7. Apply genetic principles to predict the outcome of genetic crosses and statistically analyze results. 8. Identify the importance of karyotypes, pedigrees, and biotechnology. 9. Identify parts of a DNA molecule, and describe replication, transcription, and translation. 10. Analyze evidence for evolution and natural selection.

Course Title: Biology for Non-Science Majors II
Common Course Number: BIOL 1309

Draft Course Description	This course will provide a survey of biological principles with an emphasis on humans, including evolution, ecology, plant and animal diversity, and physiology. THIS COURSE IS NOT INTENDED FOR SCIENCE MAJORS. Recommended co-requisite: BIOL 1109 – Biology for Non-Science Majors II Laboratory
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Describe modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation. 2. Describe phylogenetic relationships and classification schemes. 3. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 4. Describe basic animal physiology and homeostasis as maintained by organ systems. 5. Compare different sexual and asexual life cycles noting their adaptive advantages. 6. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.

Course Title: Biology for Non-Science Majors II Laboratory
Common Course Number: BIOL 1109

Draft Course Description	This laboratory-based course accompanies BIOL 1309, Biology for Non-Science Majors II. Laboratory activities will reinforce a survey of biological principles with an emphasis on humans, including evolution, ecology, plant and animal diversity, and physiology. Pre-/Co-requisite: BIOL 1309 – Biology for Non-Science Majors II
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Define modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation. 5. Describe phylogenetic relationships and classification schemes. 6. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 7. Describe basic animal physiology and homeostasis as maintained by organ systems. 8. Compare different sexual and asexual life cycles noting their adaptive advantages. 9. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.

Course Title: General Botany
Common Course Number: BIOL 1311

Draft Course Description	Fundamental biological concepts relevant to plant physiology, life cycle, growth and development, structure and function, and cellular and molecular metabolism. The role of plants in the environment, evolution, and phylogeny of major plant groups, algae, and fungi. (This course is intended for science majors.) Recommended co-requisite: BIOL 1111 – General Botany Laboratory Recommended prerequisite: MATH 1314 – Successful completion of College Algebra or concurrent enrollment in higher level mathematics is recommended.
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Compare and contrast the structures, reproduction, and characteristics of plants, algae, and fungi. 2. Describe the characteristics of life and the basic properties of substances needed for life. 3. Identify the principles of inheritance and solve classical genetic problems. 4. Describe phylogenetic relationships and classification schemes. 5. Identify the major phyla of life with an emphasis on plants, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 6. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 7. Identify the substrates, products, and important chemical pathways in photosynthesis and respiration. 8. Describe the unity and diversity of plants and the evidence for evolution through natural selection. 9. Compare different sexual and asexual life cycles noting their adaptive advantages. 10. Describe the reasoning processes applied to scientific investigations and thinking.

Course Title: General Botany Laboratory
Common Course Number: BIOL 1111

Draft Course Description	This laboratory-based course accompanies Biology 1307, General Botany. Laboratory activities will reinforce fundamental biological concepts relevant to plant physiology, life cycle, growth and development, structure and function, and cellular and molecular metabolism. The role of plants in the environment, evolution, and phylogeny of major plant groups, algae, and fungi. (This course is intended for science majors.) Pre-/Co-requisite: BIOL 1311 – General Botany
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Compare and contrast the structures, reproduction, and characteristics of plants, algae, and fungi. 5. Describe the characteristics of life and the basic properties of substances needed for life 6. Identify the principles of inheritance and solve classical genetic problems. 7. Describe phylogenetic relationships and classification schemes. 8. Identify the major phyla of life with an emphasis on plants, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 9. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 10. Identify the substrates, products, and important chemical pathways in photosynthesis and respiration. 11. Describe the unity and diversity of plants and the evidence for evolution through natural selection. 12. Compare different sexual and asexual life cycles noting their adaptive advantages. 13. Describe the reasoning processes applied to scientific investigations and thinking.

Course Title: General Zoology
Common Course Number: BIOL 1313

Draft Course Description	Fundamental biological concepts relevant to animals, including systematics, evolution, structure and function, cellular and molecular metabolism, reproduction, development, diversity, phylogeny, and ecology. (This course is intended for science majors.) Recommended co-requisite: BIOL 1113 – General Zoology Laboratory Recommended prerequisite: MATH 1314 – Successful completion of College Algebra or concurrent enrollment in higher level mathematics is recommended.
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Compare and contrast the structures, reproduction, and characteristics of animals. 2. Describe the characteristics of life and the basic properties of substances needed for life. 3. Identify the principles of inheritance and solve classical genetic problems. 4. Describe phylogenetic relationships and classification schemes. 5. Identify the major phyla of life with an emphasis on animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 6. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 7. Identify the substrates, products, and important chemical pathways in respiration. 8. Describe the unity and diversity of animals and the evidence for evolution through natural selection. 9. Describe the reasoning processes applied to scientific investigations and thinking. 10. Describe basic animal physiology and homeostasis as maintained by organ systems. 11. Describe modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation. 12. Describe the structure of cell membranes and the movement of molecules across a membrane.

Course Title: General Zoology Laboratory
Common Course Number: BIOL 1113

Draft Course Description	This laboratory-based course accompanies Biology 1307, General Botany. Laboratory activities will reinforce fundamental biological concepts relevant to animals, including systematics, evolution, structure and function, cellular and molecular metabolism, reproduction, development, diversity, phylogeny, and ecology. (This course is intended for science majors.) Pre-/Co-requisite: BIOL 1313 – General Zoology
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Compare and contrast the structures, reproduction, and characteristics of animals. 5. Describe the characteristics of life and the basic properties of substances needed for life. 6. Identify the principles of inheritance and solve classical genetic problems. 7. Describe phylogenetic relationships and classification schemes. 8. Identify the major phyla of life with an emphasis on animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance. 9. Identify the chemical structures, synthesis, and regulation of nucleic acids and proteins. 10. Identify the substrates, products, and important chemical pathways in respiration. 11. Describe the unity and diversity of animals and the evidence for evolution through natural selection. 12. Describe the reasoning processes applied to scientific investigations and thinking. 13. Describe basic animal physiology and homeostasis as maintained by organ systems. 14. Describe modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation. 15. Describe the structure of cell membranes and the movement of molecules across a membrane.

Course Title: Microbiology for Science Majors
Common Course Number: BIOL 2321

Draft Course Description	Principles of microbiology, including metabolism, structure, function, genetics, and phylogeny of microbes. The course will also examine the interactions of microbes with each other, hosts, and the environment. Recommended co-requisite: BIOL 2121 – Microbiology for Science Majors Laboratory Prerequisites: CHEM 1311 – General Chemistry I and CHEM 1111 – General Chemistry I Laboratory **AND** BIOL 1306 – Biology for Science Majors I and BIOL 1106 – Biology for Science Majors I Laboratory; and BIOL 1307 – Biology for Science Majors II and BIOL 1107 – Biology for Science Majors II Laboratory **OR** BIOL 1311 – General Botany and BIOL 1111 – General Botany Laboratory; and BIOL 1313 General Zoology and BIOL 1113 General Zoology Laboratory
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health including biofilms. 2. Identify unique structures, capabilities, genetic information flow of microorganisms 3. Compare the life cycles and structures of different types of viruses 4. Discuss how microscopy has revealed the structure and function of microorganisms. 5. Give examples of the range of metabolic diversity exhibited by microorganisms, impact of metabolic characteristics on growth, and control of growth. 6. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships. 7. Describe the causes and consequences of mutations on microbial evolution and the generation of diversity as well as human impacts on adaptation. 8. Classify interactions of microorganisms on human and non-human hosts as neutral, detrimental, or beneficial.

Course Title: Microbiology for Science Majors Laboratory
Common Course Number: BIOL 2121

Draft Course Description	This laboratory-based course accompanies Biology 2321, Microbiology for Science Majors. Laboratory activities will reinforce principles of microbiology, including metabolism, structure, function, genetics, and phylogeny of microbes. The course will also examine the interactions of microbes with each other, hosts, and the environment. Pre-/Co-requisite: BIOL 2321 – Microbiology for Science Majors
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Be able to apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data. 2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory. 3. Communicate effectively the results of scientific investigations. 4. Provide examples of the impact of microorganisms on agriculture, environment, ecosystem, energy, and human health including biofilms. 5. Identify unique structures, capabilities, genetic information flow of microorganisms. 6. Compare the life cycles and structures of different types of viruses. 7. Discuss how microscopy has revealed the structure and function of microorganisms. 8. Give examples of the range of metabolic diversity exhibited by microorganisms, impact of metabolic characteristics on growth, and control of growth. 9. Describe evidence for the evolution of cells, organelles, and major metabolic pathways from early prokaryotes and how phylogenetic trees reflect evolutionary relationships. 10. Describe the causes and consequences of mutations on microbial evolution and the generation of diversity as well as human impacts on adaptation. 11. Classify interactions of microorganisms on human and non-human hosts as neutral, detrimental, or beneficial.

Course Title: Organic Chemistry I
Common Course Number: CHEM 2323

Draft Course Description	Fundamental principles of organic chemistry will be studied, including the structure, bonding, properties, and reactivity of organic molecules; and properties and behavior of organic compounds and their derivatives. Emphasis is placed on organic synthesis and mechanisms. Includes study of covalent and ionic bonding, nomenclature, stereochemistry, structure and reactivity, reaction mechanisms, functional groups, and synthesis of simple molecules. THIS COURSE IS INTENDED FOR STUDENTS IN SCIENCE OR PRE-PROFESSIONAL PROGRAMS. Co-requisite: CHEM 2123—Organic Chemistry I Laboratory Prerequisite: CHEM 1312—General Chemistry II and CHEM 1112—General Chemistry II Laboratory, or CHEM 1412—General Chemistry II (Lecture and Laboratory)
Draft Course Outcomes	Upon successful completion of the course, students will: 1. Classify organic compounds by structure, molecular orbitals, hybridization, resonance, tautomerism, polarity, chirality, conformation, and functionality. 2. Identify organic molecules using appropriate organic nomenclature. 3. Describe the principle reactions for syntheses of molecules, ions, and radicals. 4. Describe organic reactions in terms of radical and ionic mechanisms. 5. Describe the use of spectroscopic data to determine the structure of organic molecules. 6. Formulate appropriate reaction conditions for the synthesis of simple organic molecules.

Course Title: Organic Chemistry I Laboratory
Common Course Number: CHEM 2123

Draft Course Description	This laboratory-based course accompanies CHEM 2323, Organic Chemistry I. Laboratory activities will reinforce fundamental principles of organic chemistry, including the structure, bonding, properties, and reactivity of organic molecules; and properties and behavior of organic compounds and their derivatives. Emphasis is placed on organic synthesis and mechanisms. Includes study of covalent and ionic bonding, nomenclature, stereochemistry, structure and reactivity, reaction mechanisms, functional groups, and synthesis of simple molecules. Methods for the purification and identification of organic compounds will be examined. Co-requisite: CHEM 2323—Organic Chemistry I
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Perform chemical experiments, analysis procedures, and waste disposal in a safe and responsible manner. 2. Utilize scientific tools such as glassware and analytical instruments to collect and analyze data. 3. Identify and utilize appropriate separation techniques such as distillation, extraction and chromatography to purify organic compounds. 4. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports. 5. Demonstrate a basic understanding of stereochemistry. 6. Classify organic compounds by structure, molecular orbitals, hybridization, resonance, tautomerism, polarity, chirality, conformation, and functionality in laboratory reports. 7. Identify organic molecules using appropriate organic nomenclature in laboratory reports. 8. Perform organic syntheses of molecules. 9. Describe organic reactions in terms of radical and ionic mechanisms in laboratory reports. 10. Use spectroscopic data to determine the structure of organic molecules. 11. Formulate appropriate reaction conditions for the synthesis of simple organic molecules.

Course Title: Organic Chemistry II
Common Course Number: CHEM 2325

Draft Course Description	Advanced principles of organic chemistry will be studied, including the structure, properties, and reactivity of aliphatic and aromatic organic molecules; and properties and behavior of organic compounds and their derivatives. Emphasis is placed on organic synthesis and mechanisms. Includes study of covalent and ionic bonding, nomenclature, stereochemistry, structure and reactivity, reaction mechanisms, functional groups, and synthesis of simple molecules. THIS COURSE IS INTENDED FOR STUDENTS IN SCIENCE OR PRE-PROFESSIONAL PROGRAMS. Co-requisite: CHEM 2125—Organic Chemistry II Laboratory Prerequisite: CHEM 2323—Organic Chemistry I and CHEM 2123—Organic Chemistry I Laboratory, or CHEM 2423—Organic Chemistry I (Lecture and Laboratory)
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Correlate molecular structure with physical and chemical properties of aliphatic and aromatic organic molecules. 2. Predict the mechanism and outcome of aliphatic and aromatic substitution and elimination reactions, given the conditions and starting materials. 3. Predict the chirality of reaction products based on enantiomeric and diastereomeric relationships. 4. Describe reaction mechanisms in terms of energetics, reaction kinetics, and thermodynamics. 5. Use spectroscopic techniques to characterize organic molecules and subgroups.

Course Title: Organic Chemistry II Laboratory
Common Course Number: CHEM 2125

Draft Course Description	This laboratory-based course accompanies CHEM 2325, Organic Chemistry II. Laboratory activities reinforce advanced principles of organic chemistry, including the structure, properties, and reactivity of aliphatic and aromatic organic molecules; and properties and behavior of organic compounds and their derivatives. Emphasis is placed on organic synthesis and mechanisms. Includes study of covalent and ionic bonding, nomenclature, stereochemistry, structure and reactivity, reaction mechanisms, functional groups, and synthesis of simple molecules. Co-requisite: CHEM 2325—Organic Chemistry II
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Perform chemical experiments, analysis procedures, and waste disposal in a safe and responsible manner. 2. Utilize scientific tools such as glassware and analytical instruments to collect and analyze data. 3. Identify and utilize appropriate separation techniques such as distillation, extraction and chromatography to purify organic compounds. 4. Record experimental work completely and accurately in laboratory notebooks, and communicate experimental results clearly in written reports. 5. Correlate molecular structure with physical and chemical properties of aliphatic and aromatic organic molecules. 6. Predict the mechanism and outcome of aliphatic and aromatic substitution and elimination reactions, given the conditions and starting materials. 7. Predict the chirality of reaction products based on enantiomeric and diastereomeric relationships. 8. Describe reaction mechanisms in terms of energetics, reaction kinetics, and thermodynamics. 9. Use spectroscopic techniques to characterize organic molecules and subgroups.

Course Title: Programming Fundamentals I
Common Course Number: COSC 1336/1436

Draft Course Description	This course introduces the fundamental concepts of structured and object-oriented programming, and provides a comprehensive introduction to programming for computer science and technology majors. Topics include software development methodology, data types, control structures, functions, arrays, and the mechanics of running, testing, and debugging. This course assumes computer literacy. (This course is included in the Field of Study Curriculum for Computer Science.)
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Describe how data are represented, manipulated, and stored in a computer. 2. Categorize different programming languages and their uses. 3. Understand and use the fundamental concepts of data types, structured programming, algorithmic design, and user interface design. 4. Demonstrate a fundamental understanding of software development methodologies, including modular design, pseudo code, flowcharting, structure charts, data types, control structures, functions, and arrays. 5. Develop projects that utilize logical algorithms from specifications and requirements statements. 6. Demonstrate appropriate design, coding, testing, and documenting of computer programs that implement project specifications and requirements. 7. Apply computer programming concepts to new problems or situations.

Course Title: Programming for Engineers
Common Course Number: ENGR 2304

Draft Course Description	Programming principles and techniques for matrix and array operations, equation solving, and numeric simulations applied to engineering problems and visualization of engineering information; platforms include spreadsheets, symbolic algebra packages, engineering analysis software, and laboratory control software.
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Use matrix and array operations for equation solving. 2. Identify the strengths and weaknesses of the conventional programming languages. 3. Use spreadsheets and their built-in features to solve a variety of engineering problems, applying both quantitative and qualitative methodologies. 4. Describe methods for the design of programs that control equipment or analyze data. 5. Write computer programs to solve engineering problems and perform engineering simulations using common software tools, such as Matlab, LabView, MathCAD, and Mathematica. 6. Graphically present engineering data, results, and conclusions.

Course Title: College Physics I
Common Course Number: PHYS 1301

Draft Course Description	Fundamental principles of physics, using algebra and trigonometry; the principles and applications of classical mechanics and thermodynamics, including harmonic motion, mechanical waves and sound, physical systems, Newton's Laws of Motion, and gravitation and other fundamental forces; with emphasis on problem solving. Co-requisite: PHYS 1101 – College Physics I Laboratory Prerequisites: MATH 1314 – College Algebra AND MATH 1316 – Plane Trigonometry or MATH 2412 Pre-Calculus
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Determine the components of linear motion (displacement, velocity, and acceleration), and especially motion under conditions of constant acceleration. 2. Apply Newton's laws to physical problems including gravity. 3. Solve problems using principles of energy. 4. Use principles of impulse and linear momentum to solve problems. 5. Solve problems in rotational kinematics and dynamics including the determination of the location of the center of mass and center of rotation for rigid bodies in motion. 6. Solve problems involving rotational and linear motion. 7. Describe the components of a wave and relate those components to mechanical vibrations, sound, and decibel level. 8. Demonstrate an understanding of equilibrium, including the different types of equilibrium. 9. Discuss simple harmonic motion and its application to quantitative problems or qualitative questions. 10. Solve problems using the principles of heat and thermodynamics. 11. Solve basic fluid mechanics problems.

Course Title: College Physics I Laboratory
Common Course Number: PHYS 1101

Draft Course Description	This laboratory-based course accompanies PHYS 1301, College Physics I. Laboratory activities will reinforce fundamental principles of physics, using algebra and trigonometry; the principles and applications of classical mechanics and thermodynamics, including harmonic motion, mechanical waves and sound, physical systems, Newton's Laws of Motion, and gravitation and other fundamental forces; emphasis will be on problem solving. Co-requisite: PHYS 1301—College Physics I
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Demonstrate techniques to set up and perform experiments, collect data from those experiments, and formulate conclusions from an experiment. 2. Record experimental work completely and accurately in laboratory notebooks**,** and communicate experimental results clearly in written reports. 3. Determine the components of linear motion (displacement, velocity, and acceleration), and especially motion under conditions of constant acceleration. 4. Apply Newton's laws to physical problems including gravity. 5. Solve problems using principles of energy. 6. Describe the components of a wave and relate those components to mechanical vibrations, sound, and decibel level. 7. Use principles of impulse and linear momentum to solve problems. 8. Solve problems in rotational kinematics and dynamics including the determination of the location of the center of mass and center of rotation for rigid bodies in motion. 9. Solve problems involving rotational and linear motion. 10. Demonstrate an understanding of equilibrium, including the different types of equilibrium. 11. Discuss simple harmonic motion and its application to quantitative problems or qualitative questions. 12. Solve problems using the principles of heat and thermodynamics. 13. Solve basic fluid mechanics problems.

Course Title: College Physics II
Common Course Number: PHYS 1302

Draft Course Description	Fundamental principles of physics, using algebra and trigonometry; the principles and applications of electricity and magnetism, including circuits, electrostatics, electromagnetism, waves, sound, light, optics, and modern physics topics; with emphasis on problem solving. Co-requisite: PHYS 1102 – College Physics II Laboratory Prerequisites: PHYS 1301 – College Physics I and PHYS 1101 – College Physics I Laboratory, or PHYS 1401 – College Physics I (lecture and laboratory)
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Solve problems involving the inter-relationship of fundamental charged particles, and electrical forces, fields, and currents. 2. Apply Kirchhoff's Rules to analysis of circuits with potential sources, capacitance, inductance, and resistance, including parallel and series capacitance and resistance. 3. Solve problems in the electrostatic interaction of point charges through the application of Coulomb's Law. 4. Solve problems involving the effects of magnetic fields on moving charges or currents, and the relationship of magnetic fields to the currents which produce them. 5. Use Faraday's and Lenz's laws to determine electromotive forces and solve problems involving electromagnetic induction. 6. Articulate the principles of reflection, refraction, diffraction, interference, and superposition of waves. 7. Describe the characteristics of light and the electromagnetic spectrum.

Course Title: College Physics II Laboratory
Common Course Number: PHYS 1102

Draft Course Description	This laboratory-based course accompanies PHYS 1302, College Physics II. Laboratory activities will reinforce fundamental principles of physics, using algebra and trigonometry; the principles and applications of electricity and magnetism, including circuits, electrostatics, electromagnetism, waves, sound, light, optics, and modern physics topics; with emphasis on problem solving. Co-requisite: PHYS 1302 – College Physics II
Draft Course Outcomes	Upon successful completion of this laboratory-based course, students will: 1. Develop techniques to set up and perform experiments, collect data from those experiments, and formulate conclusions from an experiment. 2. Demonstrate the collections, analysis, and reporting of data using the scientific method. 3. Record experimental work completely and accurately in laboratory notebooks**,** and communicate experimental results clearly in written reports. 4. Solve problems involving the inter-relationship of fundamental charged particles, and electrical forces, fields, and currents. 5. Apply Kirchhoff's Rules to analysis of circuits with potential sources, capacitance, inductance, and resistance, including parallel and series capacitance and resistance. 6. Solve problems in the electrostatic interaction of point charges through the application of Coulomb's Law. 7. Solve problems involving the effects of magnetic fields on moving charges or currents, and the relationship of magnetic fields to the currents which produce them. 8. Use Faraday's and Lenz's laws to determine electromotive forces and solve problems involving electromagnetic induction. 9. Solve problems applying the principles of reflection, refraction, diffraction, interference, and superposition of waves. 10. Solve practical problems involving optics, lenses, mirrors, and optical instruments.

Course Title: Elementary Chemical Engineering
Common Course Number: ENGR 2333

Draft Course Description	This course is the foundation for nearly all future chemical engineering courses and analysis. A strong foundation in mathematics, physics, and chemistry is required for application to the solution of problems in industrial chemistry. Students will receive an introduction to chemical engineering calculations, unit equations, process stoichiometry, material and energy balances, and states of matter, and will apply the laws of conservation of mass and energy to reacting and non-reacting, simple and complex chemical systems. Prerequisites: ENGR 1201 – Introduction to Engineering, CHEM 1312 – General Chemistry II and CHEM 1112 – General Chemistry II Laboratory (or CHEM 1412 – General Chemistry II (Lecture and Laboratory), MATH 2414 – Calculus II, PHYS 2425 – University Physics I
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Apply various systems of units to chemical engineering problems. 2. Define and relate process variables. 3. Describe qualitatively the basic unit operations of chemical processes and the principles of operation for each. 4. Use a systematic approach to solve chemical engineering problems by identifying variables, drawing a process flow chart from a written description, applying degrees of freedom analysis, and formulating mathematical expressions. 5. Apply material balances for reacting and non-reacting systems. 6. Apply energy balances for reacting and non-reacting systems. 7. Present basic engineering information in reports.

Course Title: Chemical Engineering Thermodynamics I
Common Course Number: ENGR 2334

Draft Course Description	Fundamental concepts of energy and thermodynamics (e.g., temperature, thermodynamic equilibrium, and heat) will be introduced; the course emphasizes techniques in the application of the fundamentals of thermodynamics to various processes as they frequently occur in chemical and bimolecular engineering. Provides the basic skills and tools necessary in designing and analyzing real-life engineering systems. Serves as preparation for other advanced courses in thermodynamics, energy conversion, heat transfer, etc. Prerequisite: MATH 2415 – Calculus III
Draft Course Outcomes	Upon successful completion of this course, students will: 1. Apply knowledge of math, engineering, and science to perform energy calculations of engineering systems and analyze the feasibility of the processes undergone by the systems. 2. Describe basic thermodynamic properties and their interrelationships. 3. Describe basic states of matter (solid, liquid, gas). 4. Define units of pressure, temperature, density, mass, and moles, SI and English system, and use conversions. 5. Use thermodynamic tables and diagrams and apply equations of state, such as the Ideal Gas Law. 6. Distinguish between steady-state and transient processes, open and closed systems. 7. Describe the meaning of specific volume, enthalpy, and internal energy and how to obtain them from thermodynamic tables and diagrams. 8. Apply first- and second-law analysis to thermodynamic processes and cycles. 9. Analyze systems, process feasibility, and efficiency for open and closed systems. 10. Define the meaning of isentropic processes; obtain entropy from thermodynamic tables and diagrams.