DEPARTMENT OF CHEMISTRY

Mission Statement

The Department of Chemistry of the Community College of Philadelphia is an academic unit whose offerings span introductory level through sophomore/junior level courses. This spectrum is designed to accommodate all who may benefit by providing a coherent basis for scientific literacy as well as the depth of knowledge and competencies required for the allied health field, for numerous AS and AAS degree programs at the College, for transfer to science-related majors at four-year institutions and/or for direct employment. The faculty are professional, caring, experienced educators who seek to challenge each student to realize their potential, to better understand, evaluate and make analytical decisions regarding the world around them and to be prepared to pursue additional studies.

Department Vision

The vision of the Department of Chemistry of the Community College of Philadelphia includes increasing the diversity of it students and enhancing their success in courses and beyond graduation, continually evaluating and modifying its course offerings in response to student, industry and employer needs, increasing the use of technology in both the classroom and the laboratory, and encouraging its faculty members to stay current with advances in their discipline and to actively participate in the professional life of the College.

Goals

To be active in K-12 outreach
To enhance diversity and success in our courses
To ensure student success after graduation
To offer courses that satisfy the needs of students, employers and industry
To ensure appropriate technology use in the classroom and laboratory
To support and encourage a professionally active faculty

STUDENT LEARNING OUTCOMES
Department of Chemistry

PROGRAMS

SCIP	Science
CHTE	Chemical Technology

COURSES

	Title	Credits
CHEM 101	General Chemistry I	4
CHEM 102	General Chemistry II	4
CHEM 103	General Chemistry I (without lab)	3
CHEM 104	General Chemistry II (without lab)	3
CHEM 105	Inquiry Into Chemistry	4
CHEM 110	Introductory Chemistry	4
CHEM 118	Introduction to Biochemistry	4
CHEM 120	Chemistry Laboratory	1
CHEM 121	College Chemistry I	4
CHEM 122	College Chemistry II	4
CHEM 203	Basic Pharmacology	3
CHEM 214	Instrumental Chemistry	5
CHEM 221	Organic Chemistry I	5
CHEM 222	Organic Chemistry II	5
PTEC 101	Introduction to Process Technology	3
PTEC 102	Plant Equipment	3
PTEC 111	Process Control I	4
PTEC 115	Process Control II	4
PTEC 125	Fluid Power and Controls	4
PTEC 135	Unit Operations	4
BTT 100	Introduction to Biomedical Technology	1
BTT 101	Biomedical Technician Training Practicum	2

PROGRAM GOALS - *SCIENCE* (SCIP)

1. Students will be prepared to successfully transfer into a science-based program at a 4-year institution
2. Students will demonstrate an understanding of scientific principles and concepts and be able to apply this knowledge to the solution of problems and performance of experiments in one or more of the natural science disciplines
3. Students will be able to competently perform laboratory tasks related to their scientific discipline
4. Communicate information in a manner appropriate to their scientific discipline using verbal, written and graphical means.

PROGRAM GOALS - *CHEMICAL TECHNOLOGY* (CHTE)

1. Students will demonstrate a foundational knowledge of general inorganic and organic chemistry principles and concepts and be able to apply this knowledge to the solution of problems and performance of experiments.

2. Student will be able to effectively collect, interpret, evaluate and communicate scientific data in multiple formats using computer technology as needed.

3. Students will demonstrate a basic understanding of analytical and instrumental concepts and techniques and develop complementary practical laboratory skills related to the science of chemistry.

4. Students will be prepared to enter the workforce as entry level technicians in industrial, research and governmental settings

COURSE OUTCOMES

CHEM 101 GENERAL CHEMISTRY I

I: the student will correctly perform unit analysis problems (involving the metric system, unit conversions, volume, density and temperature) applying significant digits and scientific notation.

II: the student will apply the basic principles of atomic theory, the nuclear atom, isotopes and atomic mass to a discussion of elements.

III: the student will demonstrate knowledge of the principles of electromagnetic radiation, energy levels in atoms, electrovalence(charge), and electron configuration.

IV: the student will demonstrate knowledge of the principles and distinguishing characteristics of ionic and molecular compounds based upon physical properties and electronegativity differences.

V: the student will correctly write molecular formulas from names of compounds and names from molecular formulas for both ionic and covalently bonded compounds

VI: the student will draw and interpret Lewis structures for molecular compounds including resonance and polarity

VII: the student will balance reactions using "inspection"; identify the mole ratio and correctly solve mole calculations and mass to mass calculations involving reactions.

VIII: the student will demonstrate knowledge of reaction energies, reaction rate, equilibrium, and Le Chatelier's principle as applied in chemical reactions.

IX: the student will correctly apply the gas laws, to solving problems related to ideal gases, real gases, atmospheric gases and greenhouse gases.

X: the student will be able to identify the principle physical attributes of the liquid state, the solid state, and the gaseous state and the energy associated with phase changes.

XI: The student will correctly and efficiently use common laboratory equipment in to properly make measurements and perform experiments.

CHEM 102 GENERAL CHEMISTRY II

I: The student will demonstrate knowledge of solution types, the dissolving process and the relationship between solubility & temperature.

II: The student will correctly perform calculations involving concentration expressed as Mass % and Molar Concentration, dilution of solutions, and solution stoichiometry

III: The student will demonstrate knowledge of the basic principles of Arrhenius Acids/Bases, and Bronsted Acids/ Bases and apply these concepts to titrations, indicators, and the calculations of pH

IV: The student will distinguish between organic and inorganic compounds and be able to identify organic functional groups, structures, and properties of organic compounds.

V: The student will demonstrate knowledge of alkanes, cycloalkanes, and their nomenclature.

VI: The student will demonstrate knowledge of the principles of unsaturated hydrocarbons (alkenes, alkynes, and aromatic compounds).

VII: The student will be able to define carbohydrates and correctly distinguish between monosaccharides, disaccharides, and polysaccharides.

VIII: The student will be able to define and identify amino acids, proteins, protein structure, and enzymes.

IX: The student will be able to define and identify the nucleic acids, nucleosides, nucleotides, DNA, RNA, transcription, and the basics of the genetic code.

X: The student will correctly and efficiently use common laboratory equipment in to properly make measurements and perform experiments.

CHEM 103 GENERAL CHEMISTRY I (WITHOUT LAB)

I: the student will correctly perform unit analysis problems (involving the metric system, unit conversions, volume, density and temperature) applying significant digits and scientific notation.

II: the student will apply the basic principles of atomic theory, the nuclear atom, isotopes and atomic mass to a discussion of elements.

III: the student will demonstrate knowledge of the principles of electromagnetic radiation, energy levels in atoms, electrovalence(charge), and electron configuration.

IV: the student will demonstrate knowledge of the principles and distinguishing characteristics of ionic and molecular compounds based upon physical properties and electronegativity differences.

V: the student will correctly write molecular formulas from names of compounds and names from molecular formulas for both ionic and covalently bonded compounds

VI: the student will draw and interpret Lewis structures for molecular compounds including resonance and polarity

VII: the student will balance reactions using “inspection”; identify the mole ratio and correctly solve mole calculations and mass to mass calculations involving reactions.

VIII: the student will demonstrate knowledge of reaction energies, reaction rate, equilibrium, and Le Chatelier’s principle as applied in chemical reactions.

IX: the student will correctly apply the gas laws, to solving problems related to ideal gases, real gases, atmospheric gases and greenhouse gases.

X: the student will be able to identify the principle physical attributes of the liquid state, the solid state, and the gaseous state and the energy associated with phase changes.

CHEM 104 GENERAL CHEMISTRY II (WITHOUT LAB)

I: The student will demonstrate knowledge of solution types, the dissolving process and the relationship between solubility & temperature.

II: The student will correctly perform calculations involving concentration expressed as Mass % and Molar Concentration, dilution of solutions, and solution stoichiometry

III: The student will demonstrate knowledge of the basic principles of Arrhenius Acids/Bases, and Bronsted Acids/ Bases and apply these concepts to titrations, indicators, and the calculations of pH

IV: The student will distinguish between organic and inorganic compounds and be able to identify organic functional groups, structures, and properties of organic compounds.

V: The student will demonstrate knowledge of alkanes, cycloalkanes, and their nomenclature.

VI: The student will demonstrate knowledge of the principles of unsaturated hydrocarbons (alkenes, alkynes, and aromatic compounds).

VII: The student will be able to define carbohydrates and correctly distinguish between monosaccharides, disaccharides, and polysaccharides.

VIII: The student will be able to define and identify amino acids, proteins, protein structure, and enzymes.

IX: The student will be able to define and identify the nucleic acids, nucleosides, nucleotides, DNA, RNA, transcription, and the basics of the genetic code.

CHEM 105 INQUIRY INTO CHEMISTRY

The Chem 105 student will:

1. Understand that science, in general, and chemistry, in particular, is a rational field of inquiry based on laboratory experimentation rather than as a fixed set of rules printed in a textbook.

2. Understand the value of a lab science where subject material is studied first hand.

3. Be able to conduct a series of experiments which will be less prescribed and more open to interpretation than those of a traditional course.

4. Be able to interpret the results of their experimentation by constructing ideas to account for results

5. Develop their ability to express the results of experiments through a series of expository essays which require reasoned thought

6. Build a scientific literacy which will permit a greater understanding of household products, industrial processes, environmental concerns and how everyday life depends on chemical phenomena.

7. Demonstrate an understanding of concepts central to chemistry including the periodic table, chemical bonding, the mole, energy, gasses, water, and acid-base concepts.

CHEM 110 INTRODUCTORY CHEMISTRY

1. Demonstrate an understanding of metric measurements, common metric prefixes, scientific notation, and metric-metric conversions.
2. Apply an understanding of the periodic chart to the broad range topics for which it is predictive. (Particularly see numbers 3, 4 and 5 below.)
3. Demonstrate an understanding of matter, classifications of matter, physical and chemical properties of matter, and physical and chemical changes of matter.
4. Demonstrate an understanding of the subatomic composition of atoms, isotopes, and ions and their relationship to atomic number, mass number, average atomic mass and charge.
5. Demonstrate an understanding of the differences between ionic and covalent (polar and non-polar) bonding of compounds in terms of their composition, properties, electron interactions, Lewis structures and nomenclature.
6. Demonstrate an understanding of the concept of mole and apply it to solving mathematical problems involving molar mass, molarity, and mass to mole conversions.
7. Apply an understanding of the Law of Conservation of Mass to balancing equations and classifying reactions.
8. Be able to solve mathematical problems involving gases by applying the appropriate gas law.
9. Demonstrate an understanding of solutions, the factors that affect solubility, solution concentration (% by mass and molarity), and dilution (using $V_1M_1 = V_2M_2$)
10. Demonstrate an understanding of pH, strong and weak acids, bases, and electrolytes.
11. Be able to identify and do simple naming (up to 10 carbons) of the 4 classes of hydrocarbons (saturated and unsaturated) and isomers.
12. Be able to identify common organic functional groups (using visual aids).

13. Demonstrate an ability in the laboratory to work safely and proficiently in handling the common laboratory equipment and chemicals used to carry out laboratory procedures, and to collect, record and analyze data.

CHEM 118 INTRODUCTION TO BIOCHEMISTRY

1. Students can use the IUPAC system in order to name various types of organic compounds (including hydrocarbons, alcohols, amines, aldehydes, ketones, and carboxylic acids) as well as predict trends in physical properties for these compounds.

2. Students can differentiate between the structural characteristics of carbohydrates, lipids and proteins.

3. Students are aware of the purpose behind the major catabolic processes involved in processing carbohydrate, lipid and protein nutrients.

4. LAB OUTCOMES:
   Students can recognize both the chemical and physical properties of the various types of organic compounds studied (hydrocarbons, alcohols, amines, aldehydes, ketones, carboxylic acids, and their derivatives); students can perform qualitative analysis labs in order to distinguish these compounds and identify unknowns; students can indicate outcomes for chemical reactions; students can perform labs designed to investigate the properties of carbohydrate, lipid and protein biomolecules.

CHEM 120 CHEMISTRY LABORATORY
Course Learning Outcomes

1. Laboratories are designed to be environments wherein students are instructed in the safe handling of chemical materials and related instruments and where they are asked to perform hands-on activities that concretely illustrate the concepts presented in lecture while challenging them to master the techniques needed for successful analysis, separation, synthesis, etc. The Chemistry Department will be solely responsible for registering and directing this population of students into the appropriate laboratory course/section. To be eligible for this course, the student would have to present documented evidence of successful completion (C or better) and earned lecture credit either from their transfer institution or from the College in CHEM 103 and/or CHEM 104.

2. The actual experiments performed by the students in this class will be directly linked to the course for which the student requires the credited laboratory experience. Each course's laboratory (experiment) schedule consists of a set of specified activities which is uniform course-wide and which is determined by the course coordinator with input from the instructors who teach that course. The experiments are chosen to supplement and enhance the lecture content of the associated Chemistry course.

CHEM 121 COLLEGE CHEMISTRY

This course is designed for students majoring in science or engineering fields. Upon successful completion of this course students should be able to:

- Use the metric system as a tool for performing calculations for measurements of length, area, mass, volume, energy, and amount of substance in terms of moles. Convert units for base and derived quantities within a given system of units as well as between different unit systems. Apply the concept of significant figures to express the inherent accuracy of measurements. Be familiar with the use of Scientific Notation to express the proper number of significant figures in measured data.
- Classify substances with regard to type; differentiate between physical and chemical properties and changes.
- Apply the knowledge of the periodicity of the elements towards the description of covalent and ionic bonding.
- Solve problems related to the quantitative aspects of chemical change; use the mole concept and the principles of stoichiometry effectively, including limiting reactants, and % yields.
- Understand models used in studying and explaining the structure, and behavior of atoms, molecules, solids, liquids, and gases.
- Use the Ideal Gas Law for determining parameters of gas phase systems; combine the gas law and the mole concept to study the quantitative aspects of gas phase chemical reactions.
- Effectively use equipment in the laboratory to properly measure mass, volume, pressure, temperature; perform basic qualitative analysis of based on characteristic simple reactions; use the method of titration for simple analytical tasks; be familiar with basic synthetic and separation techniques like filtration, crystallization, etc.

CHEM 122 COLLEGE CHEMISTRY II

This course is a continuation of Chemistry 121. Upon successful completion of this course students should be able to:

- Understand the concepts governing behaviors of solutions, including intermolecular forces. Able to perform calculations regarding concentrations of solutions in different units, prepare solutions of required concentrations in the laboratory using proper techniques.
- Understand and apply colligative properties of solutions, solve related problems, and apply the concepts for molar mass calculations.
- Apply the principles of kinetics to find rates of reactions and explore mechanisms of simple chemical changes. Use the principles of equilibrium to interpret behaviors of weak electrolytes, buffer solutions and solubilities of sparingly soluble salts. Apply the above principles to evaluate the pH of acids of different strengths.
- Understand and use the principles of oxidation reduction reactions, and electrochemistry including voltaic and electrolytic cells.
- Use concepts in thermodynamics to explain spontaneity of reactions, activation energy associated with chemical changes, and the role of thermodynamic functions in describing equilibrium systems.
- Use laboratory techniques related to volumetric analysis, be able to use simple instruments in the laboratory, and understand the difference between qualitative and quantitative analysis.

CHEM 203 BASIC PHARMACOLOGY

The student will demonstrate an understanding of the history, legislation and current standards used in the development of pharmaceutical agents.

The student will demonstrate an understanding of the pharmacokinetics of pharmacological agents including absorption, distribution, biotransformation and excretion.

The student will demonstrate an understanding of the principles of pharmacodynamics.

The student will demonstrate an understanding of the principles of drug interactions and drug-nutrient interactions, distinguishing between pharmacokinetic and pharmacodynamic interactions.

The student will demonstrate an understanding of the principles of adverse drug interactions, distinguishing between pharmacokinetic and pharmacodynamic interactions.

The student will demonstrate an understanding of the pharmacology of central nervous system agents.

The student will demonstrate an understanding of the pharmacology of autonomic nervous system agents.

The student will demonstrate an understanding of the pharmacology of drugs used to treat endocrine system disorders.

The student will demonstrate an understanding of the pharmacology of anti-infective and anti-inflammatory agents.

The students will demonstrate an understanding of the pharmacology of drugs used to treat respiratory system disorders.

The students will demonstrate an understanding of the pharmacology of drugs used to treat cardiovascular disorders.

The student will demonstrate an understanding of the pharmacology of drugs used to treat gastrointestinal disorders.

The student will demonstrate an understanding of the pharmacology of drugs used to treat movement disorders.

The student will describe dosage, route of administration, pharmacokinetics, therapeutic serum levels, contraindications, adverse effects, interactions and nursing implications associated with administering vaccines and toxoids used in immunization.

The student will demonstrate an understanding of the pharmacology of drugs used in the treatment of dermatological disorders.

The student will demonstrate an understanding of the pharmacology of drugs used in treating eye disorders.

The student will demonstrate an understanding of the pharmacology of drugs used in treating neoplastic disease….removed from slo's…moved to NEHSON: Nursing 201(as of Fall 2011)

The student will demonstrate an understanding of the pharmacology of psychotherapeutic agents.

CHEM 214 INSTRUMENTAL CHEMISTRY

The student will learn principles of

1. Instrumentation
2. Analytical data treatment
3. Spectroscopy
4. Nuclear magnetic resonance (NMR)
5. Infrared spectroscopy
6. Fourier transform spectroscopy (FTIR)
7. Spectrophotometry
8. Emission and absorption photometry
9. Chromatographic techniques
10. Mass spectrometry, electrophoresis, and X-ray spectroscopy

CHEM 221 ORGANIC CHEMISTRY I

Students will be able to:

Identify the different classification of compounds from a condensed line structure, line angle formula, or Lewis structure.

Determine the name of organic compounds by using the IUPAC naming system. Predict the structure when given the name. Recognize its common name.

Draw the three dimensional structure of a molecule, its mirror image and label each base on spatial orientation and rotation of plane polarized light.

Explain the mechanism, thermodynamic and kinetic of a chemical reaction.

Compare the differences between substitutions, (SN_1, SN_2) and eliminations (E_1, E_2) reactions by type of solvent used, stereochemistry involved, substrates required, nucleophile and base needed.

Describe and perform methods of product purification from a chemical reaction.

CHEM 222 ORGANIC CHEMISTRY II

Students will be able to:

Identify the structure of an organic compound base on spectroscopy data.

Demonstrate the general types of reaction that different classifications of compound undergo.

Name the carboxylic acid derivatives and describe their reaction mechanism.

Explain the relative stability of aromatic compounds and demonstrate their reaction mechanism.

Recognize condensation reactions and write out their mechanism of reaction.

Use the IUPAC system to name an organic compound when the structure is composed of multiple functional groups.

PTEC 101 INTRODUCTION TO PROCESS TECHNOLOGY

Course Goals

- At the completion of this course, the student will understand the basic roles, responsibilities, and expectations for a career in Process Technology.
- At the completion of this course, the student will understand team dynamics and be able to work effectively with teams encountered in process industries.
- At the completion of this course, the student will be able to apply basic physics concepts to process industries.
- At the completion of this course, the student have the knowledge to apply basic chemistry concepts to process industries.
- At the completion of this course, the student will be able to explain the basic history, current issues, and trends in process industries.
- At the completion of this course, the student will understand the importance of safety, health, and the environment in process industries.
- At the completion of this course, the student will understand the guiding principles of quality in the process industries.

PTEC 102 PLANT EQUIPMENT

Course Learning Outcomes

1. The student will explain the purpose and function of basic piping and valves used in the process industry.
2. The student will explain the operating principles and function of basic tanks, drums, and vessels used in the process industry.
3. The student will explain the operating principles and function of pumps used in the process industry.
4. The student will explain the operating principles and function of compressors used in the process industry.
5. The student will explain the operating principles and function of steam turbines used in the process industry.
6. The student will explain the operating principles and function of electricity and motors used in the process industry.
7. The student will explain the operating principles and function of heat exchangers used in the process industry.
8. The student will explain the operating principles and function of cooling towers and fin fans used in the process industry.
9. The student will explain the operating principles and function of furnaces used in the process industry.
10. The student will explain the operating principles and function of boilers used in the process industry.
11. The student will explain the operating principles and function of process utilities in the process industry.
12. The student will explain the operating principles and function of process auxiliaries in the process industry.
13. The student will explain the operating principles and function of process control instrumentation in the process industry.
14. The student will apply the guiding principles of distillation in the process industry

15. The student will demonstrate the ability to draw and read process systems drawings
16. The student will demonstrate effective teamwork skills
17. The student will demonstrate the ability to carry out laboratory procedures, interpret laboratory results, and knowledge of basic scientific principles that underlie the operation and function of plant equipment.

PTEC 111 PROCESS CONTROL I

1. At the completion of this course, the student will be able to demonstrate an understanding of the purpose and function of process control instrumentation used in process industries.
2. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with pressure control used in process industries.
3. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with temperature control used in process industries.
4. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with level control used in process industries.
5. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with flow control used in process industries.
6. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with analytical control used in process industries.
7. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and instruments associated with miscellaneous measuring devices used in process industries.
8. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and function of control loops used in process industries.
9. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and function of primary sensors, transmitters and transducers used in process industries.
10. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and function of controllers and the final control element used in process industries.

11. At the completion of this course, the student will be able to demonstrate an understanding of the operating principles and function of control valves and regulators used in process industries.
12. At the completion of this course, the student will be able to demonstrate an understanding of the purpose and function of process diagrams and instrument sketching used in process industries.

PTEC 115 PROCESS CONTROL II

At the completion of this course, the student will be able to demonstrate

- the practices related to instrumentation troubleshooting used in process industries.
- the operating principles and instruments associated with switches, relays, and annunciators used in process industries.
- the operating principles and instruments associated with signal transmission and conversion used in process industries.
- the operating principles and instruments associated with controllers used in process industries.
- the operating principles and instruments associated with control schemes used in process industries.
- the operating principles and instruments associated with advanced control schemes used in process industries.
- the operating principles and instruments associated introductory digital control used in process industries.
- the operating principles and function of programmable logic controls used in process industries.
- the operating principles and function of Distributed Control Systems (DCSs) used in process industries.
- the operating principles and function of instrumentation power supply used in process industries.
- the operating principles and function of emergency shutdown (SD), interlocks, and protective devices used in process industries.
- typical instrument malfunctions in the context of their operating principles that can occur in process industries.

PTEC 125 FLUID POWER AND CONTROLS

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

1. Demonstrate understanding of the theoretical aspects of fluids and fluid power
2. Students will demonstrate the ability to work as part of team.
3. Demonstrate understanding of the use of fluid systems with heat and mass transfer applications.
4. Carry out necessary maintenance and calibration to increase performance and efficiency of fluid flow and fluid power systems.
5. Upon successful completion of this course, students will demonstrate an understanding of safety issues related to fluid power applications

PTEC 135 UNIT OPERATIONS

STUDENT LEARNING OUTCOMES

At the completion of this course students will be able to:

1. Recall key concepts from prior Process Technology courses, be able to apply the basic principles, characteristics and applications of process controls systems to unit operations and be able to analyze a complex process in order to identify sub-processes as they relate to a unit and its operation.
2. Apply concepts of quality control and quality assurance in the context of unit operations, and be able to explain the role that technicians play in maintaining quality in a variety of circumstances, such as start up, normal operations, and shut down.
3. Explain the basic function and major processing stages of a generic operating unit as used in process industries, by integrating knowledge from prior courses regarding basic equipment and systems, plant auxiliary and utility systems, as well as block flow diagrams and process flow diagrams.
4. Explain the purpose and function of a pilot plant and discuss issues of scale-up in relation to process industries
5. Explain the importance of start-up procedures and compare and contrast the procedures needed for start-up under different conditions, such as initial start-up and commissioning of a unit, and start-up after a routine shut-down.
6. Explain the normal operations of housekeeping and complying with Safety, Health and Environmental (SH&E) policies used in process industries.
7. Explain the importance of shut-down procedures and compare and contrast the procedures needed for shut-down under different conditions, such as decommissioning of a unit and routine shut-down.
8. Explain the role of regulatory agencies in various process industries, and apply knowledge of regulatory agencies to unit start-up, normal operation, and shut-down.
9. Demonstrate the ability to work effectively as part of a team in the completion of assigned tasks related to the course, and discuss the importance of communication between all staff members managing a process.
10. Explain the operating principles and function of information systems used in the process industry.
11. Explain the importance of laboratory practices which are people and environmentally safe, and their role in process industries.

BTT 100 INTRODUCTION TO BIOMEDICAL TECHNOLOGY

This course will prepare participants to:

- Understand the role of research technicians in the laboratory
- Know, understand, and follow basic laboratory safety protocols, including how to handle and properly dispose of hazardous or infectious materials
- Set up a functional laboratory bench and identify and accurately use bench-top instruments and equipment including balances, volumetric glassware, micropipettes, centrifuges, UV-vis spectrometers, water baths, and microscopes
- Prepare solutions, growth media, and buffers of desired concentration/pH from pure reagents and solvents and prepare dilute solutions from stock solutions
- Perform experiments and collect, record and analyze data
- Use sterile techniques to grow, harvest, and split bacterial and eukaryotic cells; transform cells with plasmid DNA; fix and stain cells for light microscopy
- Isolate and purify samples of protein, RNA, and plasmid DNA from cells; use restriction enzymes to cut DNA; analyze such samples by electrophoresis and by the use of antibody visualization techniques

BTT 101 BIOMEDICAL TECHNICIAN TRAINING PRACTICUM

The Practicum experience will allow students to:

- Plan and set up assigned experiments.
- Perform the experiments.
- Collect and analyze the data. And Develop data record keeping skills
- Report results of the experiments.
- Use and maintain laboratory equipment and reagents.
- Organize and keep records of purchases and supplies.
- Prepare reagents and solutions
- Practice calculating molarity, set up percent solutions, and prepare dilutions of stock solutions.
- Develop skills to sterilize solutions, use sterile techniques, follow protocols, perform assays, and interpret results.
- Practice biosafety level requirements in conjunction with using biosafety cabinets.
- Develop additional laboratory skills such as eukaryotic cell culture techniques, how to grow and view bacteria, and DNA and RNA isolation methods.
- Examine the theory behind research techniques.