School of Arts and Sciences

The Certificate in Sciences for the Health Professions is a post-baccalaureate science program designed to meet the needs of students with bachelor’s degrees in non-science fields who seek a career change into the health professions, but lack some or all of the necessary science and mathematics background. It thus offers an affordable means for academically qualified students to prepare themselves for admission into professional programs in this field. Acceptance into this Certificate program requires an earned bachelor’s degree with a GPA of at least 3.0.

*Gainful Employment Mandatory Disclosure Statement

Fall 2017- Subject to Revision

Required  (16 credits)

- BIO 130 Biological Principles I  4
- BIO 131 Biological Principles II  4
- CHM 152 General Chemistry Principles I  4
- CHM 153 General Chemistry Principles II  4

Electives (34 credits selected from the following)

- BIO 125 Nutrition  3
- BIO 170 Human Anatomy & Physiology I  4
- BIO 171 Human Anatomy & Physiology II  4
- BIO 220 Medical Microbiology  4
- BIO 270 Anatomy & Physiology I  4
- BIO 271 Anatomy & Physiology II  4
- BIO 343 Principles of Genetics  3
- BIO 348 Cell Biology  3
- BIO 380 Pre-professional Experience I  3
- BIO 381 Pre-professional Experience II  3
- CHM 260 Fundamentals of Organic Chemistry  4
- CHM 270 Organic Chemistry I  5
- CHM 271 Organic Chemistry II  5
- CHM 380 Biochemistry  4
CHM 381 Advanced Biochemistry 3
MTH 129 Precalculus with Applications 4
MTH 130 Calculus with Applications 4
MTH 150 Calculus I 4
MTH 151 Calculus II 4
PHY 135 College Physics I 4
PHY 136 College Physics II 4
PHY 143 General Physics I 4
PHY 144 General Physics II 4

Total Required Credits: 50

**Course Descriptions**

**BIO 130 Biological Principles I**
This course deals with biological processes primarily at the molecular and cellular level, and develops the foundations of evolutionary and ecological concepts. There is a study of cell structure, and an examination of cellular composition and metabolic processes including enzyme activity, respiration, and photosynthesis. Principles of genetics are studied at the cellular and molecular level, with reference to current techniques in molecular biology. Evolutionary mechanisms are introduced and ecological concepts are presented as a unifying theme. Note: BIO 130 is the first course in the required two-semester introductory sequence in the Bioscience Curriculum Core. It is also approved in the Natural Sciences General Education Competency Area and can serve as a lower-level laboratory science elective within the Liberal Arts. Note: the laboratory course, BIO 130L is a part of your grade for this course. Corequisite(s): BIO 130L Credits: 4

**BIO 131 Biological Principles II**
This course deals with biological processes primarily at the organismal level, and examines the diversity of living things. The origins and adaptations of the Prokaryota, Protista, and Fungi are explored, with emphasis on their ecological roles, economic value, and medical significance. Plant life cycles are introduced, and plant structure, physiology, and utilization are studied. The evolution and adaptations of various animal phyla are presented, with a consideration of structure and function in each; organ systems are studied with emphasis on humans as representative vertebrates. Note: BIO 131 is the second course in the required two-semester introductory in the Bioscience Curriculum Core. It is also approved in the Natural Sciences General Education Competency Area and can serve as a lower-level laboratory science elective within the Liberal Arts. Note: the laboratory course, BIO 131L is a part of your grade for this course. Prerequisite(s): BIO 130 Corequisite(s): BIO 131L Credits: 4

**CHM 152 General Chemistry Principles I**
The first part of a two semester sequence in General Chemistry Principles with laboratory. This course covers the qualitative and quantitative aspects of scientific measurement, the nature of matter, gases, liquids and solids, energy, atomic theory, properties of elements, chemical bonding, molecular structure and properties, stoichiometry, thermochemistry and solutions. Note: the laboratory course CHM 152L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): (MP3, RMAT, RMTB, or MTH 116) and (Regents Chemistry or an equivalent High School Chemistry with Laboratory or CHM 124) Credits: 4
CHM 153 General Chemistry Principles II
A continuation of General Chemistry Principles I, which includes laboratory. Topics include: solutions and their colligative properties, acids and bases, chemical equilibrium, ionic equilibrium, pH, buffers, titration curves, oxidation and reduction balancing, electrochemistry, chemical kinetics, the covalent bond and the shape of molecules. Note: the laboratory course CHM 153L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): CHM 152 Credit: 4

BIO 125 Nutrition
This course provides a basic background in the nature and biochemical function of essential and non-essential nutrients, the molecular basis of metabolism and nutrient requirements of living cells and organisms. The role of nutrients in gene expression, genetically modified foods and the role of diet in the treatment of diseases. Credits: 3

BIO 170 Human Anatomy & Physiology I
This is the first semester of a two-semester sequence in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate preparation for nursing and other allied health professions. Topics included in Anatomy and Physiology I are: basic anatomical and directional terminology, fundamental concepts and principles of cell biology, histology, and the integumentary, skeletal, muscular, and nervous systems. Students may not receive credit for both BIO 170 and BIO 270. Note: the laboratory course, BIO 170L is a part of your grade for this course. Prerequisite(s): High School biology with a lab or BIO 120 or 123 or 130; High School or College chemistry recommended Corequisite(s): BIO 170L Credits: 4

BIO 171 Human Anatomy & Physiology II
This is the second semester of a two-semester sequence in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate for students with a strong foundation in basic biological principles. Anatomy and Physiology II are: the endocrine system, the cardiovascular system, the lymphatic system and immunity, the respiratory system, the digestive system, metabolism, the urinary system, fluid/electrolyte and acid/base balance; and the reproductive systems. Note: students may not receive credit for both BIO 171 and BIO 271. Note: the laboratory course, BIO 171L is a part of your grade for this course. Prerequisite(s): BIO 170 Corequisite(s): BIO 171L Credits: 4

BIO 220 Medical Microbiology
The role of microbes as causative agents of disease in human hosts; the morphological characterization of pathogenic species, classification of communicable diseases and epidemiological aspects. Host-parasite relationship, infection, and host-resistance mechanisms; sero-diagnostic methods in medical practice. Chemotherapy, mode of action of antibiotics, sterilization, disinfection methods and contamination control. Note: the laboratory course, BIO 220L is a part of your grade for this course. Prerequisite(s): BIO 166 or 170 or 171 or 130 or 131 Corequisite(s): BIO 220L Credits: 4

BIO 270 Anatomy & Physiology I
BIO 270 is a course in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate for students with a strong foundation in basic biological principles. Anatomy and Physiology I includes: anatomical and directional terminology, histology, and the integumentary, skeletal, muscular, nervous, and endocrine systems. Note: The required course sequence for nursing students is BIO 170 and 171. Students may not receive credit for both BIO 170 and BIO 270. Note: the laboratory course, BIO 270L is a part of your grade for this course. Prerequisite(s): BIO 130 or equivalent with a C- or higher Corequisite(s): BIO 270L Credits: 4
BIO 271 Anatomy & Physiology II
BIO 271 is a course in which human anatomy and physiology are studied using a body systems approach, with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. This sequence is appropriate for students with a strong foundation in basic biological principles. Anatomy & Physiology II includes: the cardiovascular, respiratory, digestive, urinary, reproductive, and immune systems, metabolism, and acid-base balance. Note: The required course sequence for nursing students is BIO 170 and 171. Students may not receive credit for both BIO 171 and BIO 271. Note: the laboratory course, BIO 271L is a part of your grade for this course. Prerequisite(s): BIO 130 or equivalent with a C- or higher Corequisite(s): BIO 271L Credits: 4

BIO 343 Principles of Genetics
A thorough study of Genetics intended for majors in the Bioscience Curriculum. Topics to be covered include cytogenetics, immunogenetics, molecular genetics, population genetics and quantitative genetics. Computer simulations and demonstrations will present genetic principles. Students will utilize computerized databases to complete independent genomic search assignments. Note: Bioscience and/or MLT students taking BIO 343 must also take BIO 344L either during the same semester or after completion of BIO 343. Prerequisite(s): BIO 130, BIO 131, BIO 210, BIO 212, and MTH 110 all with a grade of C- or higher. Credits: 3

BIO 348 Cell Biology
This course investigates how cells develop, work, communicate, and control their activities. Topics include basic biochemistry and metabolism, DNA structure and function, membrane/organellar function and transport, cell communication, the cytoskeleton, and cell division. At the completion of this course the student should be able to engage in the broad themes of cell and molecular biology, and to relate these concepts to other studies in biology and other disciplines. Note: Bioscience and/or MLT students taking BIO 348 must also take BIO 349L during the same semester or after completion of BIO 348. Prerequisite(s): BIO 130, 131, 210 and 212 or (BIO 130 and MLT 227) all with a grade of C- or higher. Credits: 3

BIO 380 Pre-professional Experience I
Recommended students will engage in one of the following for at least 135 hours: 1) health care volunteer work that involves patient assistance in the health care environment; 2) shadowing of a health care professional (physician, physician assistant, physical therapist, occupational therapist, dentist, veterinarian etc...). The final grade is assigned by the Internship Coordinator based on consultation with the supervisor/health professional and evaluation of reports, logs and a final report prepared by the student. Students must submit a resume to the internship coordinator at least 3 months before registering for the course. Prerequisite(s): Junior Status in Bioscience and (BIO 130 and 131) or BIO 166 or (BIO 170 and BIO 171) or BIO 220 or BIO 414 with a grade of C- or higher, recommendation by two Biology faculty members, submission of a resume to the Internship Coordinator at least 3 months prior to registering for the course, approval of the Internship Coordinator; additional courses in Human Anatomy and Physiology and/or Medical Microbiology recommended for some sites. Credits: 3

BIO 381 Pre-professional Experience II
Recommended for students engaged in one of the following for at least 135 hours: 1) health care volunteer work that involves patient assistance in the health care environment; 2) shadowing of a health care professional (physician, physician assistant, physical therapist, occupational therapist, dentist, veterinarian, etc.) The final grade is assigned by the Internship Coordinator based on consultation with the supervisor/health professional and evaluation of reports, logs, and a final report prepared by the student. Prerequisite(s): BIO 380 with a grade of B or higher. Credits: 3

CHM 260 Fundamentals of Organic Chemistry
A one semester course in organic chemistry designed to provide background in the fundamentals of nomenclature, mechanisms, structures, and synthesis of carbon based compounds. This course is designed for science and health science majors who desire a general rather than a detailed knowledge of the compounds of carbon. Topics to be covered include: structure and bonding, acid/base chemistry, isomerism, stereochemistry, and structure determination. Functional groups to
be covered include: hydrocarbons, alcohols, ethers, aldehydes and ketones, carboxylic acids, carboxylic acid derivatives and amines. Laboratory work will include common organic techniques and experiments supporting the principles covered in lecture. Note: the laboratory course CHM 260L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): CHM 153 Credits: 4

CHM 270 Organic Chemistry I
A study of the compounds of carbon involving a thorough integration of observation and theory and emphasizing the relationships between structures, properties, mechanisms and reactions. This course, intended for science and pre-professional majors, covers topics such as bonding and structure, alkanes, alkenes, alkynes, cycloaliphatic hydrocarbons, stereochemistry, dienes, benzene, electrophilic aromatic substitution, arenes, spectroscopy and structure determination. Note: the laboratory course CHM 270L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): CHM 153 Credits: 5

CHM 271 Organic Chemistry II
A continuation of CHM 270. Topics covered include: alkyl and aryl halides, alcohols and phenols, ethers and epoxides, carboxylic acids, esters, anhydrides, aldehydes, ketones, amines, amino acids, carbohydrates, heterocycles and polymers. Note: the laboratory course CHM 271L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): CHM 270 Credits: 5

CHM 380 Biochemistry
A one semester course covering the fundamentals of biochemistry. Topics covered include: the structure and function of important biomolecules such as carbohydrates lipids, amino acids, proteins and nucleic acids; enzyme kinetics and the use of cofactors and coenzymes; and metabolic pathways including glycolysis, TCA, electron transport system, fatty acid and amino acid pathways. Laboratory work includes current biochemical laboratory techniques such as chromatography and electrophoresis, application of specific topics described above, and analysis of data from laboratory experiments. Note: the laboratory course CHM 380L is a part of your grade for this course. Attendance in the laboratory course is required. Approved eye-protection and a laboratory coat are required materials. A student must pass the laboratory course to receive a passing grade in the entire course. Prerequisite(s): CHM 260 or CHM 271 Credits: 4

CHM 381 Advanced Biochemistry
A continuation of the concepts covered in Biochemistry. Students will examine the pathways, enzymes, and organic chemical mechanisms involved in the metabolic pathways of carbohydrates, lipids, amino acids, nucleic acids, and photosynthesis. Additional emphasis will be placed on the unique coenzymes that are required for these metabolisms. Students will also be trained in reading and interpreting research publications in biochemistry. Prerequisite(s): CHM 271 and CHM 380 Credits: 3

MTH 129 Precalculus with Applications
This is a precalculus course with applications from various disciplines including technology, science, and business. Topics include families of functions, mechanics of functions, exponential and logarithmic functions, trigonometric functions and complex numbers. The emphasis is on applications and problem solving. A graphing calculator is required. Note: Students completing this course may not receive credit for MTH 117. Prerequisite(s): MP3 or MTH 116 Credits: 4

MTH 130 Calculus with Applications
This is a calculus course for those not majoring in Mathematics, Engineering Science or Computer Science. Topics include the derivative, differentiation of algebraic, trigonometric, exponential and logarithmic functions, applications of the derivative and the definite integral. Applications are taken from technology, science, and business. Problem solving is stressed.
MTH 150 Calculus I
This is the first course of the calculus sequence. Topics include, differentiation of functions of one variable, introduction to integration, application of differentiation and integration. A graphing calculator is required. Note: Students completing this course may not receive credit for MTH 130. Prerequisite(s): MP4 or MTH 117 or 129 Credits: 4

MTH 151 Calculus II
A continuation of the calculus of one variable. Topics include, differentiation and integration of the transcendental functions, integration techniques, polar coordinates and infinite series. Prerequisite(s): MTH 130 or MTH 150 Credits: 4

PHY 135 College Physics I
An integrated theory/laboratory general college physics course without calculus. Topics will include fundamental concepts of units, vectors, equilibrium, velocity and acceleration in linear and rotational motion, force, energy, momentum, fluids at rest and in motion, and oscillatory motion. Laboratory problems, experiments and report writing associated with the topics studied in the theory are performed. Prerequisite(s): MTH 129 Corequisite(s): PHY 135L Credits: 4

PHY 136 College Physics II
A continuation of PHY 135. Topics will include heat, electricity, magnetism, light and optics. Prerequisite(s): PHY 135 Corequisite(s): PHY 136L Credits: 4

PHY 143 General Physics I
A fundamental, calculus based, physics course with laboratory offered primarily for students in Science curricula. Topics discussed include Mechanics, Wave Motion, Kinetic Theory, and Thermodynamics. One of MTH 130 or MTH 150 must be taken either as a prerequisite or corequisite. Credits: 4

PHY 144 General Physics II
A continuation of PHY 143. Topics discussed include Electricity, Magnetism and Optics. Prerequisite(s): PHY 143 Corequisite(s): PHY 144L Credits: 4

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.