

## STEM FIELDS AND CIP CODES

To qualify for the 17 month STEM OPT extension students must be enrolled in a program with one the CIP code classifications below and their employer must be an E-Verify employer.

### **Agroecology and Agriculture 01.0308**

**01.0308 Agroecology** and Sustainable Agriculture. A program that focuses on agricultural principles and practices that, over the long term, enhance environmental quality, make efficient use of nonrenewable resources, integrate natural biological cycles and controls, and are economically viable and socially responsible; and that may prepare individuals to apply this knowledge to the solution of agricultural and environmental problems. Includes instruction in principles of **agroecology**, crop and soil sciences, entomology, horticulture, animal science, weed science and management, soil fertility and nutrient cycling, applied ecology, agricultural economics, and rangeland ecology and watershed management.

### **Animal Sciences 01.09xx**

- 01.0901 Animal Sciences, General.** A general program that focuses on the scientific principles that underlie the breeding and husbandry of agricultural animals, and the production, processing, and distribution of agricultural animal products. Includes instruction in the animal sciences, animal husbandry and production, and agricultural and food products processing.
- 01.0902 Agricultural Animal Breeding.** A program that focuses on the application of genetics and genetic engineering to the improvement of agricultural animal health, the development of new animal breeds, and the selective improvement of agricultural animal populations. Includes instruction in genetics, genetic engineering, population genetics, animal health, animal husbandry, and biotechnology.
- 01.0903 Animal Health.** A program that focuses on the application of biological and chemical principles to the study, prevention, and control of diseases in agricultural animal populations. Includes instruction in environmental science, pharmacology, animal population studies, genetics, animal physiology and diet, disease prevention, treatment methodologies, and laboratory and testing procedures.
- 01.0904 Animal Nutrition.** A program that focuses on the biology and chemistry of proteins, fats, carbohydrates, water, vitamins, and feed additives as related to animal health and the production of improved animal products. Includes instruction in nutrition science, animal health and physiology, biochemistry, cellular and molecular biology, animal husbandry, and food science.
- 01.0905 Dairy Science.** A program that focuses on the application of biological and chemical principles to the production and management of dairy animals and the production and handling of dairy products. Includes instruction in animal sciences, nutrition sciences, food science and technology, biochemistry, and related aspects of human and animal health and safety.
- 01.0906 Livestock Management.** A program that focuses on the application of biological and chemical principles to the production and management of livestock animals and the production and handling of meat and other products. Includes instruction in animal sciences, range science, nutrition science, food science and technology, biochemistry, and related aspects of human and animal health and safety.
- 01.0907 Poultry Science.** A program that focuses on the application of biological and chemical principles to the production and management of poultry animals and the production and handling of poultry products. Includes instruction in avian sciences, nutrition sciences, food science and technology, biochemistry, hatchery design, and related aspects of human and animal health and safety.
- 01.0999 Animal Sciences, Other.** Any instructional program in the animal sciences not listed above.

### **Food Science and Technology 01.10xx**

- 01.1001 Food Science.** A program that focuses on the application of biological, chemical, and physical principles to the study of converting raw agricultural products into processed forms suitable for direct human consumption, and the storage of such products. Includes instruction in applicable aspects of the agricultural sciences, human physiology and nutrition, food chemistry, agricultural products processing, food additives, food preparation and packaging, food storage and shipment, and related aspects of human health and safety including toxicology and pathology
- 01.1002 Food Technology and Processing.** A program that focuses on the application of chemical, physical, and engineering principles to the development and implementation of manufacturing, packaging, storage, and distribution technologies and processes for food products. Includes instruction in food engineering, food preservation and handling, food preparation, food packaging and display, food storage and shipment, and related equipment and facilities design, operation, and maintenance.
- 01.1099 Food Science and Technology, Other.** Any instructional program in food sciences and technology not listed above.

### **Plant Sciences 01.11xx**

- 01.1101 Plant Sciences, General.** A general program that focuses on the scientific principles that underlie the breeding, cultivation, and production of agricultural plants, and the production, processing, and distribution of agricultural plant products. Includes instruction in the plant sciences, crop cultivation and production, and agricultural and food products processing.
- 01.1102 Agronomy and Crop Science.** A program that focuses on the chemical, physical, and biological relationships of crops and the soils nurturing them. Includes instruction in the growth and behavior of agricultural crops, the development of new plant varieties, and the scientific management of soils and nutrients for maximum plant nutrition, health, and productivity.
- 01.1103 Horticultural Science.** A program that focuses on the scientific principles related to the cultivation of garden and ornamental plants, including fruits, vegetables, flowers, and landscape and nursery crops. Includes instruction in specific types of plants, such as citrus; breeding horticultural varieties; physiology of horticultural species; and the scientific management of horticultural plant development and production through the life cycle.
- 01.1104 Agricultural and Horticultural Plant Breeding.** A program that focuses on the application of genetics and genetic engineering to the improvement of agricultural plant health, the development of new plant varieties, and the selective improvement of agricultural plant populations. Includes instruction in genetics, genetic engineering, population genetics, agronomy, plant protection, and biotechnology.
- 01.1105 Plant Protection and Integrated Pest Management.** A program that focuses on the application of scientific principles to the control of animal, insect and weed infestation of domesticated plant populations and other settings, including agricultural crops; the prevention/reduction of attendant economic loss; and the control of environmental pollution and degradation related to pest infestation and pest control measures. Includes instruction in entomology, applicable animal sciences, plant pathology and physiology, weed science, crop science, and environmental toxicology.
- 01.1106 Range Science and Management.** A program that focuses on the scientific study of rangelands, arid regions, grasslands, and other areas of low productivity, as well as the principles of managing such resources for maximum benefit and environmental balance. Includes instruction in livestock management, wildlife biology, plant sciences, ecology, soil science, and hydrology.
- 01.1199 Plant Sciences, Other.** Any instructional program in plant sciences not listed above.

### **Soil Sciences 01.12xx**

- 01.1201 Soil Science and Agronomy, General.** A program that generally focuses on the scientific classification of soils, soil properties, and their relationship to agricultural crops. Includes instruction in soil chemistry, soil physics, soil biology, soil fertility, morphogenesis, mineralogy, hydrology, agronomy, and soil conservation and management.
- 01.1202 Soil Chemistry and Physics.** A program that focuses on the application of chemical and physical principles to research and analysis concerning the nature and properties of soils and the conservation and management of soils. Includes instruction in soil and fluid mechanics, mineralogy, sedimentology, thermodynamics, geomorphology, environmental systems, analytical methods, and organic and inorganic chemistry.
- 01.1203 Soil Microbiology.** A program that focuses on application of microbiological theory and methods to the study of the organismic properties of soils, soil-plant and soil-animal interactions, and the biological components and effects of soil management strategies. Includes instruction in microbiology and related biological sciences, applicable animal and plant sciences, soil chemistry and physics as related to biological characteristics, and environmental science.
- 01.1299 Soil Sciences, Other.** Any instructional program in Soil Sciences not listed above.

### **Natural Resources Conservation and Research 03.01xx**

- 03.0101 Natural Resources/Conservation, General.** A general program that focuses on the studies and activities relating to the natural environment and its conservation, use, and improvement. Includes instruction in subjects such as climate, air, soil, water, land, fish and wildlife, and plant resources; in the basic principles of environmental science and natural resources management; and the recreational and economic uses of renewable and nonrenewable natural resources.
- 03.0103 Environmental Studies.** A program that focuses on environment-related issues using scientific, social scientific, or humanistic approaches or a combination. Includes instruction in the basic principles of ecology and environmental science and related subjects such as policy, politics, law, economics, social aspects, planning, pollution control, natural resources, and the interactions of human beings and nature.
- 03.0104 Environmental Science.** A program that focuses on the application of biological, chemical, and physical principles to the study of the physical environment and the solution of environmental problems, including

subjects such as abating or controlling environmental pollution and degradation; the interaction between human society and the natural environment; and natural resources management. Includes instruction in biology, chemistry, physics, geosciences, climatology, statistics, and mathematical modeling.

**03.0199 Natural Resources Conservation and Research, Other.** Any instructional program in natural resources conservation and research not listed above.

#### **Water, Wetlands, and Marine Resources Management 03.0205**

**03.0205 Water, Wetlands, and Marine Resources Management.** A program that prepares individuals to apply the principles of marine/aquatic biology, oceanography, natural resource economics, and natural resources management to the development, conservation, and management of freshwater and saltwater environments. Includes instruction in subjects such as wetlands, riverine, lacustrine, coastal, and oceanic water resources; water conservation and use; flood control; pollution control; water supply logistics; wastewater management; aquatic and marine ecology; aquatic and marine life conservation; and the economic and recreational uses of water resources.

#### **Forestry 03.05xx**

**03.0502 Forest Sciences and Biology.** A program that focuses on the application of one or more forest-related sciences to the study of environmental factors affecting forests and the growth and management of forest resources. Includes instruction in forest biology, forest hydrology, forest mensuration, silviculture, forest soils, water resources, environmental science, forest resources management, and wood science.

**03.0508 Urban Forestry.** A program that prepares individuals to apply the principles of forestry and related sciences to the development, care, and maintenance of individual trees and forested areas within or close to areas of dense human habitation. Includes instruction in urban environments; effects of pollution on tree species; environmental design and landscaping; urban pest infestation; urban forest management; and applicable policies and regulations.

**03.0509 Wood Science and Wood Products/Pulp and Paper Technology.** A program that focuses on the application of chemical, physical, and engineering principles to the analysis of the properties and behavior of wood and wood products and the development of processes for converting wood into paper and other products. Includes instruction in wood classification and testing, product development, manufacturing and processing technologies, and the design and development of related equipment and systems.

#### **Wildlife, Fish and Wildlands Science and Management 03.0601**

**03.0601 Wildlife, Fish and Wildlands Science and Management.** A program that prepares individuals to conserve and manage wilderness areas and the flora, marine and aquatic life therein, and manage wildlife reservations and zoological/aquarium facilities for recreational, commercial, and ecological purposes. Includes instruction in wildlife biology, marine/aquatic biology, environmental science, freshwater and saltwater ecosystems, natural resources management and policy, outdoor recreation and parks management, the design and operation of natural and artificial wildlife habitats, applicable law and regulations, and related administrative and communications skills.

#### **Architectural and Building Sciences/Technology 04.0902**

**04.0902 Architectural and Building Sciences/Technology.** A program that focuses on the application of advanced technology to building design and construction, retrofitting existing buildings, and efficient operation of buildings, including lighting and daylight design, acoustics, solar design, building conservation, and energy-conscious design. Includes instruction in architecture, building technology, civil and structural engineering, mechanical engineering, environmental control systems, sustainability, and computer tools and applications.

#### **Radio, Television, and Digital Communication 09.0702**

**09.0702 Digital Communication and Media/Multimedia.** A program that focuses on the development, use, critical evaluation, and regulation of new electronic communication technologies using computer applications; and that prepares individuals to function as developers and managers of digital communications media. Includes instruction in computer and telecommunications technologies and processes; design and development of digital communications; marketing and distribution; digital communications regulation, law, and policy; the study of human interaction with, and use of, digital media; and emerging trends and issues.

#### **Graphic Communication 10.0304**

**10.0304 Animation, Interactive Technology, Video Graphics and Special Effects.** A program that prepares individuals to use computer applications and related visual and sound imaging techniques to manipulate images and information originating as film, video, still photographs, digital copy, soundtracks, and physical objects in order to communicate messages simulating real-world content. Includes instruction in specialized camerawork and equipment operation and maintenance, image capture, computer

programming, dubbing, CAD applications, and applications to specific commercial, industrial, and entertainment needs.

#### **Computer Science 11.xxxx**

- 11.0101 Computer and Information Sciences, General.** A general program that focuses on computing, computer science, and information science and systems as part of a broad and/or interdisciplinary program. Such programs are undifferentiated as to title and content and are not to be confused with specific programs in computer science, information science, or related support services.
- 11.0102 Artificial Intelligence and Robotics.** A program that focuses on the symbolic inference, representation, and simulation by computers and software of human learning and reasoning processes and capabilities, and the modeling of human motor control and motions by computer-driven machinery. Includes instruction in computing theory, cybernetics, human factors, natural language processing, robot design, and applicable aspects of engineering, technology, and specific end-use applications.
- 11.0103 Information Technology.** A program that focuses on the design of technological information systems, including computing systems, as solutions to business and research data and communications support needs. Includes instruction in the principles of computer hardware and software components, algorithms, databases, telecommunications, user tactics, application testing, and human interface design.
- 11.0104 Informatics.** A program that focuses on computer systems from a user-centered perspective and studies the structure, behavior and interactions of natural and artificial systems that store, process and communicate information. Includes instruction in information sciences, human computer interaction, information system analysis and design, telecommunications structure and information architecture and management.
- 11.0199 Computer and Information Sciences, Other.** Any instructional program in computer science not listed above.
- 11.0201 Computer Programming/Programmer, General.** A program that focuses on the general writing and implementation of generic and customized programs to drive operating systems and that generally prepares individuals to apply the methods and procedures of software design and programming to software installation and maintenance. Includes instruction in software design, low- and high-level languages and program writing; program customization and linking; prototype testing; troubleshooting; and related aspects of operating systems and networks.
- 11.0202 Computer Programming, Specific Applications.** A program that prepares individuals to apply the knowledge and skills of general computer programming to the solution of specific operational problems and customization requirements presented by individual software users and organizational users. Includes training in specific types of software and its installation and maintenance.
- 11.0203 Computer Programming, Vendor/Product Certification.** A program that prepares individuals to fulfill the requirements set by vendors for professional qualification as certified installation, customization, and maintenance engineers for specific software products and/or processes. Includes training in specific vendor supported software products and their installation and maintenance.
- 11.0299 Computer Programming, Other.** Any instructional program in computer programming not listed above.
- 11.0301 Data Processing and Data Processing Technology/Technician.** A program that prepares individuals to master and use computer software programs and applications for inputting, verifying, organizing, storing, retrieving, transforming (changing, updating, and deleting), and extracting information. Includes instruction in using various operating system configurations and in types of data entry such as word processing, spreadsheets, calculators, management programs, design programs, database programs, and research programs.
- 11.0401 Information Science/Studies.** A program that focuses on the theory, organization, and process of information collection, transmission, and utilization in traditional and electronic forms. Includes instruction in information classification and organization; information storage and processing; transmission, transfer, and signaling; communications and networking; systems planning and design; human interfacing and use analysis; database development; information policy analysis; and related aspects of hardware, software, economics, social factors, and capacity.
- 11.0501 Computer Systems Analysis/Analyst.** A program that prepares individuals to apply programming and systems analysis principles to the selection, implementation, and troubleshooting of customized computer and software installations across the life cycle. Includes instruction in computer hardware and software; compilation, composition, execution, and operating systems; low- and high-level languages and language programming; programming and debugging techniques; installation and maintenance testing and documentation; process and data flow analysis; user needs analysis and documentation; cost-benefit analysis; and specification design.
- 11.0701 Computer Science.** A general program that focuses on computers, computing problems and solutions, and the design of computer systems and user interfaces from a scientific perspective. Includes instruction in the principles of computational science, and computing theory; computer hardware design; computer development and programming; and applications to a variety of end-use situations.
- 11.0801 Web Page, Digital/Multimedia and Information Resources Design.** A program that prepares individuals to apply HTML, XML, Javascript, graphics applications, and other authoring tools to the design, editing, and publishing (launching) of documents, images, graphics, sound, and multimedia products on the

World Wide Web. Includes instruction in Internet theory; web page standards and policies; elements of web page design; user interfaces; vector tools; special effects; interactive and multimedia components; search engines; navigation; morphing; e-commerce tools; and emerging web technologies.

- 11.0802 Data Modeling/Warehousing and Database Administration.** A program that prepares individuals to design and manage the construction of databases and related software programs and applications, including the linking of individual data sets to create complex searchable databases (warehousing) and the use of analytical search tools (mining). Includes instruction in database theory, logic, and semantics; operational and warehouse modeling; dimensionality; attributes and hierarchies; data definition; technical architecture; access and security design; integration; formatting and extraction; data delivery; index design; implementation problems; planning and budgeting; and client and networking issues.
- 11.0803 Computer Graphics.** A program that focuses on the software, hardware, and mathematical tools used to represent, display, and manipulate topological, two-, and three-dimensional objects on a computer screen and that prepares individuals to function as computer graphics specialists. Includes instruction in graphics software and systems; digital multimedia; graphic design; graphics devices, processors, and standards; attributes and transformations; projections; surface identification and rendering; color theory and application; and applicable geometry and algorithms.
- 11.0804 Modeling, Virtual Environments and Simulation.** A program focusing on the principles of applied visual simulation technology and the application of quantitative analyses to human-computer interaction. Includes instruction in object-oriented programming, artificial intelligence, computer communications and networks, computer graphics, virtual worlds and simulation systems, probability, statistics, stochastic modeling, data analysis, human-performance evaluation, and human-behavior modeling.
- 11.0899 Computer Software and Media Applications, Other.** Any instructional program in computer software and media applications not listed above.
- 11.0901 Computer Systems Networking and Telecommunications.** A program that focuses on the design, implementation, and management of linked systems of computers, peripherals, and associated software to maximize efficiency and productivity, and that prepares individuals to function as network specialists and managers at various levels. Includes instruction in operating systems and applications; systems design and analysis; networking theory and solutions; types of networks; network management and control; network and flow optimization; security; configuring; and troubleshooting.
- 11.1001 System Administration/Administrator.** A program that prepares individuals to manage the computer operations and control the system configurations emanating from a specific site or network hub. Includes instruction in computer hardware and software and applications; local area (LAN) and wide area (WAN) networking; principles of information systems security; disk space and traffic load monitoring; data backup; resource allocation; and setup and takedown procedures.
- 11.1002 System, Networking, and LAN/WAN Management/Manager.** A program that prepares individuals to oversee and regulate the computer system and performance requirements of an entire organization or network of satellite users. Includes instruction in performance balancing; redundancy; local area (LAN) and wide area (WAN) network management; system migration and upgrading; outage control; problem diagnosis and troubleshooting; and system maintenance budgeting and management.
- 11.1003 Computer and Information Systems Security.** A program that prepares individuals to assess the security needs of computer and network systems, recommend safeguard solutions, and manage the implementation and maintenance of security devices, systems, and procedures. Includes instruction in computer architecture, programming, and systems analysis; networking; telecommunications; cryptography; security system design; applicable law and regulations; risk assessment and policy analysis; contingency planning; user access issues; investigation techniques; and troubleshooting.
- 11.1004 Web/Multimedia Management and Webmaster.** A program that prepares individuals to develop and maintain web servers and the hosted web pages at one or a group of web sites, and to function as designated webmasters. Includes instruction in computer systems and networks; server installation and maintenance; web page design and editing; information resources management; web policy and procedures; Internet applications of information systems security; user interfacing and usability research; and relevant management and communications skills.
- 11.1005 Information Technology Project Management.** A program that prepares individuals to design, develop, and manage information technology projects in a variety of companies and organizations. Includes instruction in principles of project management, risk management, procurement and contract management, information security management, software management, organizational principles and behavior, communications, quality assurance, financial analysis, leadership, and team effectiveness.
- 11.1006 Computer Support Specialist.** A program that prepares individuals to provide technical assistance, support, and advice to computer users to help troubleshoot software and hardware problems. Includes instruction in computer concepts, information systems, networking, operating systems, computer hardware, the Internet, software applications, help desk concepts and problem solving, and principles of customer service.
- 11.1099 Computer/Information Technology Services, Administration and Management, Other.** Any instructional program in computer/information technology services administration and management not listed above.

### Education 13.xxxx

- 13.0501 Educational/Instructional Technology.** A program that focuses on integrating technology into educational curricula. Includes instruction in foundations of educational technology, computer applications, utilizing technology for assessment, multimedia instruction, web-based instruction, distance education, and designing and producing educational software and materials.
- 13.0601 Educational Evaluation and Research.** A program that focuses on the principles and procedures for generating information about educational programs, personnel and methods, and the analysis of such information for planning purposes. Includes instruction in evaluation theory, evaluation research design and planning, administering evaluations and related data collection activities, data reporting requirements, data analysis and interpretation, and related economic and policy issues.
- 13.0603 Educational Statistics and Research Methods.** A program that focuses on the application of statistics to the analysis and solution of educational research problems, and the development of technical designs for research studies. Includes instruction in mathematical statistics, research design, computer applications, instrument design, research methodologies, and applications to research problems in specific education subjects.

### Engineering 14.xxxx

- 14.0101 Engineering, General.** A program that generally prepares individuals to apply mathematical and scientific principles to solve a wide variety of practical problems in industry, social organization, public works, and commerce.
- 14.0102 Pre-Engineering.** A program that prepares individuals for admission or transfer to a baccalaureate-level program in any of the fields of engineering.
- 14.0201 Aerospace, Aeronautical and Astronautical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of aircraft, space vehicles, and their systems; applied research on flight characteristics; and the development of systems and procedures for the launching, guidance, and control of air and space vehicles.
- 14.0301 Agricultural/Biological Engineering and Bioengineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems, equipment and facilities used to produce, process and store agricultural products; to improve the productivity of agricultural methods; and to develop improved agricultural biological systems.
- 14.0401 Architectural Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of materials, systems, and methods used to construct and equip buildings intended for human habitation or other purposes.
- 14.0501 Biomedical/Medical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of biological and health systems and products such as integrated biological systems, instrumentation, medical information systems, artificial organs and prostheses, and health management and care delivery systems.
- 14.0601 Ceramic Sciences and Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of inorganic non-metallic materials, such as porcelains, cements industrial ceramics, ceramic superconductors, abrasive, and related materials and systems.
- 14.0701 Chemical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems employing chemical processes, such as chemical reactors, kinetic systems, electrochemical systems, energy conservation processes, heat and mass transfer systems, and separation processes; and the applied analysis of chemical problems such as corrosion, particle abrasion, energy loss, pollution, and fluid mechanics. NAFSA note: the latest SEVP STEM list omits code 14.0701, Chemical Engineering, which we believe is an inadvertent omission. NAFSA has contacted SEVIS.source to report this.
- 14.0702 Chemical and Biomolecular Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems at the interface of chemical engineering and biology, with an emphasis at the molecular level, such as biopharmaceutical processes, protein engineering, metabolic engineering, gene therapy, biomaterials, cell and tissue engineering, and drug delivery. Includes instruction in chemical engineering, thermodynamics, organic chemistry, biochemistry, momentum and heat transfer, cellular and molecular biotechnology, process design, and chemical reactor design.
- 14.0799 Chemical Engineering, Other.** Any instructional program in chemical engineering not listed above.
- 14.0801 Civil Engineering, General.** A program that generally prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of structural, load-bearing, material moving, transportation, water resource, and material control systems; and environmental safety measures.
- 14.0802 Geotechnical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for manipulating and controlling surface and subsurface features at or incorporated into structural sites, including earth and rock moving and stabilization, land fills, structural use and environmental stabilization of wastes and by-

products, underground construction, and groundwater and hazardous material containment.

- 14.0803 Structural Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of materials and systems used in building load-bearing structures for various purposes and in different environments, including buildings, roads, rail lines, bridges, dams, conduits, offshore platforms and work stations, and other structural shells; and the analysis of structural problems such as, failure, fabrication, safety, and natural hazards.
- 14.0804 Transportation and Highway Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of total systems for the physical movement of people, materials and information, including general network design and planning, facilities planning, site evaluation, transportation management systems, needs projections and analysis, and analysis of costs.
- 14.0805 Water Resources Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for collecting, storing, moving, conserving and controlling surface- and groundwater, including water quality control, water cycle management, management of human and industrial water requirements, water delivery, and flood control.
- 14.0899 Civil Engineering, Other.** Any instructional program in Civil Engineering not listed above.
- 14.0901 Computer Engineering, General.** A program that generally prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of computer hardware and software systems and related equipment and facilities; and the analysis of specific problems of computer applications to various tasks.
- 14.0902 Computer Hardware Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development, and evaluation of computer hardware and related peripheral equipment. Includes instruction in computer circuit and chip design, circuitry, computer systems design, computer equipment design, computer layout planning, testing procedures, and related computer theory and software topics.
- 14.0903 Computer Software Engineering.** A program that prepares individuals to apply scientific and mathematical principles to the design, analysis, verification, validation, implementation, and maintenance of computer software systems using a variety of computer languages. Includes instruction in discrete mathematics, probability and statistics, computer science, managerial science, and applications to complex computer systems.
- 14.0999 Computer Engineering, Other.** Any instructional program in Computer Engineering not listed above.
- 14.1001 Electrical, Electronics and Communications Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of electrical, electronic and related communications systems and their components, including electrical power generation systems; and the analysis of problems such as superconductor, wave propagation, energy storage and retrieval, and reception and amplification.
- 14.1003 Laser and Optical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of optical systems, lasers and related electronic devices. Includes instruction in wave theory and mechanics, electromagnetic applications, linear and non-linear optics, photon detecting, laser beam properties, directed energy, harmonic generation, optical systems, shielding and the design and implementation of related systems and equipment.
- 14.1004 Telecommunications Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development, and maintenance of telecommunications technology, networks, and systems. Includes instruction in telecommunications, computer networking, communications networks and systems, signals, circuits, fiber optics, and wireless systems and technology.
- 14.1099 Electrical, Electronics and Communications Engineering, Other.** Any instructional program in Electrical, Electronics and Communications Engineering not listed above.
- 14.1101 Engineering Mechanics.** A program with a general focus on the application of the mathematical and scientific principles of classical mechanics to the analysis and evaluation of the behavior of structures, forces and materials in engineering problems. Includes instruction in statics, kinetics, dynamics, kinematics, celestial mechanics, stress and failure, and electromagnetism.
- 14.1201 Engineering Physics.** A program with a general focus on the general application of mathematical and scientific principles of physics to the analysis and evaluation of engineering problems. Includes instruction in high- and low-temperature phenomena, computational physics, superconductivity, applied thermodynamics, molecular and particle physics applications, and space science research.
- 14.1301 Engineering Science.** A program with a general focuses on the general application of various combinations of mathematical and scientific principles to the analysis and evaluation of engineering problems, including applied research in human behavior, statistics, biology, chemistry, the earth and planetary sciences, atmospheric and meteorology, and computer applications.
- 14.1401 Environmental/Environmental Health Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for controlling contained living environments and for monitoring and controlling factors in the external natural environment, including pollution control, waste and hazardous material disposal, health and safety

protection, conservation, life support, and requirements for protection of special materials and related work environments.

- 14.1801** **Materials Engineering.** A program that prepares individuals to apply mathematical and materials science principles to the design, development and operational evaluation of materials and related processes used in manufacturing in a wide variety of settings; the synthesis of new industrial materials, including marrying and bonding composites; analysis of materials requirements and specifications; and related problems of system design dependent on materials factors.
- 14.1901** **Mechanical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of physical systems used in manufacturing and end-product systems used for specific uses, including machine tools, jigs and other manufacturing equipment; stationary power units and appliances; engines; self-propelled vehicles; housings and containers; hydraulic and electric systems for controlling movement; and the integration of computers and remote control with operating systems.
- 14.2001** **Metallurgical Engineering.** A program that prepares individuals to apply mathematical and metallurgical principles to the design, development and operational evaluation of metal components of structural, load-bearing, power, transmission, and moving systems; and the analysis of engineering problems such as stress, creep, failure, alloy behavior, environmental fluctuations, stability, electromagnetic and thermodynamic characteristics, optimal manufacturing processes, and related design considerations.
- 14.2101** **Mining and Mineral Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of mineral extraction, processing and refining systems, including open pit and shaft mines, prospecting and site analysis equipment and instruments, environmental and safety systems, mine equipment and facilities, mineral processing and refining methods and systems, and logistics and communications systems.
- 14.2201** **Naval Architecture and Marine Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of self-propelled, stationary, or towed vessels operating on or under the water, including inland, coastal and ocean environments; and the analysis of related engineering problems such as corrosion, power transfer, pressure, hull efficiency, stress factors, safety and life support, environmental hazards and factors, and specific use requirements.
- 14.2301** **Nuclear Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for controlling and manipulating nuclear energy, including nuclear power plant design, fission reactor design, fusion reactor design, reactor control and safety systems design, power transfer systems, containment vessels and structures design; and the analysis of related engineering problems such as fission and fusion processes, human and environmental factors, construction, and operational considerations.
- 14.2401** **Ocean Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems to monitor, control, manipulate and operate within coastal or ocean environments, such as underwater platforms, flood control systems, dikes, hydroelectric power systems, tide and current control and warning systems, and communications equipment; the planning and design of total systems for working and functioning in water or underwater environments; and the analysis of related engineering problems such as the action of water properties and behavior on physical systems and people, tidal forces, current movements, and wave motion.
- 14.2501** **Petroleum Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for locating, extracting, processing and refining crude petroleum and natural gas, including prospecting instruments and equipment, mining and drilling systems, processing and refining systems and facilities, storage facilities, transportation systems, and related environmental and safety systems.
- 14.2701** **Systems Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of total systems solutions to a wide variety of engineering problems, including the integration of human, physical, energy, communications, management, and information requirements as needed, and the application of requisite analytical methods to specific situations.
- 14.2801** **Textile Sciences and Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems to test and manufacture fibers and fiber products, both synthetic and natural; to develop new and improved fibers, textiles and their uses; and to the analysis of related engineering problems such as structural factors, molecular synthesis, chemical manufacturing, weaves, strength and stress, useful life, dyes, and applications to composite systems.
- 14.3101** **Materials Science.** A program that focuses on the general application of mathematical and scientific principles to the analysis and evaluation of the characteristics and behavior of solids, including internal structure, chemical properties, transport and energy flow properties, thermodynamics of solids, stress and failure factors, chemical transformation states and processes, compound materials, and research on industrial applications of specific materials.
- 14.3201** **Polymer/Plastics Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of synthesized macromolecular

compounds and their application to specific engineering uses, including the development of industrial materials with tailored properties, the design of lightweight structural components, the use of liquid or solid polymers, and the analysis and control of polymerization processes.

- 14.3301 Construction Engineering.** A program that prepares individuals to apply scientific, mathematical, and management principles to the planning, design, and building of facilities and structures. Includes instruction in civil engineering, structural principles, site analysis, computer-assisted design, geology, evaluation and testing, materials, contracting, project management, graphic communications, and applicable laws and regulations.
- 14.3401 Forest Engineering.** A program that prepares individuals to apply scientific, mathematical, and forestry principles to the design of mechanical devices and processes for efficient forest management, timber production and related forest logistics systems. Includes instruction in forest products processing, forest management, forest harvesting, timber structure design, production analysis, road and bridge construction, vehicle adaptation and design, and harvesting equipment design.
- 14.3501 Industrial Engineering.** A program that prepares individuals to apply scientific and mathematical principles to the design, improvement, and installation of integrated systems of people, material, information, and energy. Includes instruction in applied mathematics, physical sciences, the social sciences, engineering analysis, systems design, computer applications, and forecasting and evaluation methodology.
- 14.3601 Manufacturing Engineering.** A program that prepares individuals to apply scientific and mathematical principles to the design, development, and implementation of manufacturing systems. Includes instruction in materials science and engineering, manufacturing processes, process engineering, assembly and product engineering, manufacturing systems design, and manufacturing competitiveness.
- 14.3701 Operations Research.** A program that focuses on the development and application of complex mathematical or simulation models to solve problems involving operational systems, where the system concerned is subject to human intervention. Includes instruction in advanced multivariate analysis, application of judgment and statistical tests, optimization theory and techniques, resource allocation theory, mathematical modeling, control theory, statistical analysis, and applications to specific research problems.
- 14.3801 Surveying Engineering.** A program that prepares individuals to apply scientific and mathematical principles to the determination of the location, elevations, and alignment of natural and manmade topographic features. Includes instruction in property line location, surveying, surface measurement, aerial and terrestrial photogrammetry, remote sensing, satellite imagery, global positioning systems, computer applications, and photographic data processing.
- 14.3901 Geological/Geophysical Engineering.** A program that prepares individuals to apply mathematical and geological principles to the analysis and evaluation of engineering problems, including the geological evaluation of construction sites, the analysis of geological forces acting on structures and systems, the analysis of potential natural resource recovery sites, and applied research on geological phenomena.
- 14.4001 Paper Science and Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development, and manufacturing of pulp and paper products. Includes instruction in pulp and paper science, pulping and bleaching processes, paper structure and processes, pulp and paper manufacturing, coating technology, surface and colloid science, and fibers.
- 14.4101 Electromechanical Engineering.** A program that prepares individuals to apply scientific and mathematical principles to the problems associated with combining electrical and mechanical components with special emphasis on manufacturing and automated processes. Includes instruction in applied mechanics, instrumentation and monitoring, machine design, automated control techniques, fluid and thermal dynamics, circuit analysis, and solid state electronics.
- 14.4201 Mechatronics, Robotics, and Automation Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of computer controlled electro-mechanical systems and products with embedded electronics, sensors, and actuators; and which includes, but is not limited to, automata, robots and automation systems. Includes instruction in mechanical engineering, electronic and electrical engineering, computer and software engineering, and control engineering.
- 14.4301 Biochemical Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the study of biochemical processes in living organisms, properties of biological materials, and processes using biochemical agents such as cells, enzymes, and antibodies. Includes instruction in biology, chemistry, physics, biochemistry, thermodynamics, fluid dynamics, bioprocesses, and chemical engineering.
- 14.4401 Engineering Chemistry.** A program that focuses on the general application of chemical principles to the analysis and evaluation of engineering problems, such as development of electronic materials, solid-state science and technology, polymers, ceramics, and biomaterials. Includes instruction in physical chemistry, organic chemistry, materials science, chemical processes and systems, chemical reaction engineering, biochemical engineering, engineering mathematics, classical and modern physics, and computer science.
- 14.4501 Biological/Biosystems Engineering.** A program that prepares individuals to apply mathematical and scientific principles to the design, development and management of biological systems; and includes applications to biology, biochemistry, ecology, and microbiology. Includes instruction in organic chemistry; microbiology; biochemistry; chemical, biological, biochemical, and process engineering; thermodynamics;

process control; kinetics and reactor design; electric circuits; biosystem modeling; and bioelectronics and instrumentation.

**14.9999 Engineering, Other.** Any instructional program in Engineering not listed above.

#### **Engineering Technologies 15.xxxx**

- 15.0000 Engineering Technology, General.** A program that generally prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in a wide variety of projects. Includes instruction in various engineering support functions for research, production, and operations, and applications to specific engineering specialties.
- 15.0101 Architectural Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of architects, engineers and planners engaged in designing and developing buildings, urban complexes, and related systems. Includes instruction in design testing procedures, building site analysis, model building and computer graphics, engineering drawing, structural systems testing, analysis of prototype mechanical and interior systems, test equipment operation and maintenance, and report preparation.
- 15.0201 Civil Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of civil engineers engaged in designing and executing public works projects such as highways, dams, bridges, tunnels and other facilities. Includes instruction in site analysis, structural testing procedures, field and laboratory testing procedures, plan and specification preparation, test equipment operation and maintenance, and report preparation.
- 15.0303 Electrical, Electronic and Communications Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of electrical, electronics and communication engineers. Includes instruction in electrical circuitry, prototype development and testing; systems analysis and testing, systems maintenance, instrument calibration, and report preparation.
- 15.0304 Laser and Optical Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using lasers and other optical for commercial or research purposes. Includes instruction in laser and optical principles, testing and maintenance procedures, safety precautions, specific applications to various tasks, and report preparation.
- 15.0305 Telecommunications Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to help design and implement telecommunications systems. Includes instruction in communications protocol, data networking, digital compression algorithms, digital signal processing, Internet access, object-oriented and relational databases, and programming languages.
- 15.0306 Integrated Circuit Design.** A program that prepares individuals to apply basic engineering principles and technical skills to design circuits in microelectronics. Includes instruction in circuit design, circuit layout, circuit analysis, computer aided drafting, and semi-conductor technologies.
- 15.0399 Electrical and Electronic Engineering Technologies/Technicians, Other.** Any program in electrical and electronic engineering-related technologies not listed above.
- 15.0401 Biomedical Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in developing biological or medical systems and products. Includes instruction in instrument calibration, design and installation testing, system safety and maintenance procedures, procurement and installation procedures, and report preparation.
- 15.0403 Electromechanical Technology/Electromechanical Engineering Technology.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in developing and testing automated, servomechanical, and other electromechanical systems. Includes instruction in prototype testing, manufacturing and operational testing, systems analysis and maintenance procedures, and report preparation.
- 15.0404 Instrumentation Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in developing control and measurement systems and procedures. Includes instruction in instrumentation design and maintenance, calibration, design and production testing and scheduling, automated equipment functions, applications to specific industrial tasks, and report preparation.
- 15.0405 Robotics Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using robots. Includes instruction in the principles of robotics, design and operational testing, system maintenance and repair procedures, robot computer systems and control language, specific system types and applications to specific industrial tasks, and report preparation.
- 15.0406 Automation Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing, installing, calibrating, modifying and maintaining automated systems. Includes instruction in computer systems; electronics and instrumentation; programmable logic controllers (PLCs); electric, hydraulic and pneumatic control systems; actuator and sensor systems; process control; robotics; applications to specific industrial tasks; and report preparation
- 15.0499 Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other.** Any instructional program in electromechanical instrumentation and maintenance technologies not listed above.

- 15.0501 Heating, Air Conditioning and Refrigeration Technology/Technician (ACH/ACR/ACHR/HRAC/HVAC/AC Technology).** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using air conditioning, refrigeration, and heating systems. Includes instruction in principles of heating and cooling technology, design and operational testing, inspection and maintenance procedures, installation and operation procedures, and report preparation.
- 15.0503 Energy Management and Systems Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing energy-efficient systems or monitoring energy use. Includes instruction in principles of energy conservation, instrumentation calibration, monitoring systems and test procedures, energy loss inspection procedures, energy conservation techniques, and report preparation.
- 15.0505 Solar Energy Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing solar-powered energy systems. Includes instruction in solar energy principles, energy storage and transfer technologies, testing and inspection procedures, system maintenance procedures, and report preparation.
- 15.0506 Water Quality and Wastewater Treatment Management and Recycling Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using water storage, waterpower, and wastewater treatment systems. Includes instruction in water storage, power and/or treatment systems and equipment; testing and inspection procedures; system maintenance procedures; and report preparation.
- 15.0507 Environmental Engineering Technology/Environmental Technology.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using indoor and outdoor environmental pollution control systems. Includes instruction in environmental safety principles, testing and sampling procedures, laboratory techniques, instrumentation calibration, safety and protection procedures, equipment maintenance, and report preparation.
- 15.0508 Hazardous Materials Management and Waste Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in identifying and disposing of hazardous materials. Includes instruction in environmental safety principles, biohazard identification, testing and sampling procedures, laboratory techniques, instrumentation calibration, hazardous waste disposal procedures and systems, safety and protection procedures, equipment maintenance, and report preparation.
- 15.0599 Environmental Control Technologies/Technicians, Other.** Any instructional program in environmental control technologies not listed above.
- 15.0607 Plastics Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using industrial polymers. Includes instruction in the principles of macromolecular chemistry, polymerization and plastic manufacturing processes and equipment, design and operational testing procedures, equipment maintenance and repair procedures, safety procedures, applications to specific products, and report preparation.
- 15.0611 Metallurgical Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and metallurgists engaged in developing and using industrial metals and manufacturing processes. Includes instruction in principles of metallurgy, related manufacturing systems, laboratory techniques, testing and inspection procedures, instrument calibration, system and equipment maintenance and repair, applications to specific processes, and report preparation.
- 15.0612 Industrial Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of industrial engineers and managers. Includes instruction in optimization theory, human factors, organizational behavior, industrial processes, industrial planning procedures, computer applications, and report and presentation preparation.
- 15.0613 Manufacturing Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to the identification and resolution of production problems in the manufacture of products. Includes instruction in machine operations, production line operations, engineering analysis, systems analysis, instrumentation, physical controls, automation, computer-aided manufacturing (CAM), manufacturing planning, quality control, and informational infrastructure.
- 15.0614 Welding Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to the design and engineering of welding and joining systems and the implementation of welding processes. Includes instruction in materials science; computer-aided design; welding design; welding processes; welding metallurgy; automation and robotics; and codes, inspections, testing, and quality assurance
- 15.0615 Chemical Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in the production and utilization of chemicals on an industrial scale. Includes instruction in organic chemistry, inorganic chemistry, analytical chemistry, biochemistry, thermodynamics, fluid mechanics, industrial processes, instrumental analysis, sampling and monitoring, and chemical and environmental safety.
- 15.0616 Semiconductor Manufacturing Technology.** A program that prepares individuals to apply basic engineering principles and technical skills to operate and monitor equipment for the fabrication of

semiconductors or microchips from silicon wafers, and to troubleshoot, maintain, and repair the specialized equipment used in this process. Includes instruction in AC and DC circuits, digital fundamentals, solid state devices, manufacturing processes, vacuum principles and technology, industrial electronics, quality assurance, and semiconductor manufacturing technology.

- 15.0699 Industrial Production Technologies/Technicians, Other.** Any instructional program in industrial production technologies not listed above.
- 15.0701 Occupational Safety and Health Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in maintaining job-related health and safety standards. Includes instruction in safety engineering principles, inspection and monitoring procedures, testing and sampling procedures, laboratory techniques, applications to specific work environments, and report preparation.
- 15.0702 Quality Control Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in maintaining consistent manufacturing and construction standards. Includes instruction in quality control systems management principles, technical standards applicable to specific engineering and manufacturing projects, testing procedures, inspection procedures, related instrumentation and equipment operation and maintenance, and report preparation.
- 15.0703 Industrial Safety Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to assist engineers and other professionals in implementing and enforcing industrial safety standards. Includes instruction in industrial processes, industrial hygiene, toxicology, ergonomics, system and process safety, safety performance measurement, human factors, human behavior, and applicable law and regulations.
- 15.0704 Hazardous Materials Information Systems Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to assist engineers and other professionals in implementing, monitoring, and enforcing hazardous materials management and removal. Includes instruction in environmental science, environmental health, human behavior, economics, management science, information systems and applications, and communication skills.
- 15.0799 Quality Control and Safety Technologies/Technologies, Other.** Any instructional program in quality control and safety technologies not listed above.
- 15.0801 Aeronautical/Aerospace Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing, manufacturing and testing aircraft, spacecraft and their systems. Includes instruction in aircraft/spacecraft systems technology, design and development testing, prototype and operational testing, inspection and maintenance procedures, instrument calibration, test equipment operation and maintenance, and report preparation.
- 15.0803 Automotive Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing, manufacturing and testing self-propelled ground vehicles and their systems. Includes instruction in vehicular systems technology, design and development testing, prototype and operational testing, inspection and maintenance procedures, instrument calibration, test equipment operation and maintenance, and report preparation.
- 15.0805 Mechanical Engineering/Mechanical Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers engaged in the design and development phases of a wide variety of projects involving mechanical systems. Includes instruction in principles of mechanics, applications to specific engineering systems, design testing procedures, prototype and operational testing and inspection procedures, manufacturing system-testing procedures, test equipment operation and maintenance, and report preparation.
- 15.0899 Mechanical Engineering Related Technologies/Technicians, Other.** Any instructional program in mechanical engineering-related technologies not listed above.
- 15.0901 Mining Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in the development and operation of mines and related mineral processing facilities. Includes instruction in principles of mineral extraction and related geology, mineral field mapping and site analysis, testing and sampling methods, instrument calibration, assay analysis, test equipment operation and maintenance, mine environment and safety monitoring procedures, mine inspection procedures, and report preparation.
- 15.0903 Petroleum Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in the development and operation of oil and natural gas extraction and processing facilities. Includes instruction in principles of petroleum extraction and related geology, petroleum field mapping and site analysis, testing and sampling methods, instrument calibration, laboratory analysis, test equipment operation and maintenance, environment and safety monitoring procedures for oil/gas fields and facilities, facility inspection procedures, and report preparation.
- 15.0999 Mining and Petroleum Technologies/Technicians, Other.** Any instructional program in mining and petroleum engineering technologies not listed above.
- 15.1001 Construction Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers, engineering contractors and other

professionals engaged in the construction of buildings and related structures. Includes instruction in basic structural engineering principles and construction techniques, building site inspection, site supervision, construction personnel supervision, plan and specification interpretation, supply logistics and procurement, applicable building codes, and report preparation.

- 15.1102 Surveying Technology/Surveying.** A program that prepares individuals to apply mathematical and scientific principles to the delineation, determination, planning and positioning of land tracts, land and water boundaries, land contours and features; and the preparation of related maps, charts and reports. Includes instruction in applied geodesy, computer graphics, photointerpretation, plane and geodetic surveying, mensuration, traversing, survey equipment operation and maintenance, instrument calibration, and basic cartography.
- 15.1103 Hydraulics and Fluid Power Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing and using fluid power and transportation systems. Includes instruction in fluid mechanics and hydraulics principles, fluid power systems, pipeline and pumping systems, design and operational testing, inspection and maintenance procedures, related instrumentation, and report preparation.
- 15.1199 Engineering-Related Technologies, Other.** Any programs in engineering-related technologies and technicians not listed above.
- 15.1201 Computer Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills in support of computer engineers engaged in designing and developing computer systems and installations. Includes instruction in computer electronics and programming, prototype development and testing, systems installation and testing, solid state and microminiature circuitry, peripheral equipment, and report preparation.
- 15.1202 Computer Technology/Computer Systems Technology.** A program that prepares individuals to apply basic engineering principles and technical skills in support of professionals who use computer systems. Includes instruction in basic computer design and architecture, programming, problems of specific computer applications, component and system maintenance and inspection procedures, hardware and software problem diagnosis and repair, and report preparation.
- 15.1203 Computer Hardware Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to support engineers in designing computer hardware and peripheral systems. Includes instruction in computer systems design, computer architecture, computer electronics, processors, peripherals, testing equipment, and computer manufacturing processes.
- 15.1204 Computer Software Technology/Technician.** A program that prepares individuals to apply basic engineering principles and technical skills to support engineers in developing, implementing, and evaluation computer software and program applications. Includes instruction in computer programming, programming languages, databases, user interfaces, networking and warehousing, encryption and security, software testing and evaluation, and customization.
- 15.1299 Computer Engineering Technologies/Technicians, Other.** Any instructional program in computer engineering technologies not listed above.
- 15.1301 Drafting and Design Technology/Technician, General.** A program that prepares individuals to generally apply technical skills to create working drawings and computer simulations for a variety of applications. Includes instruction in specification interpretation, dimensioning techniques, drafting calculations, material estimation, technical communications, computer applications, and interpersonal communications.
- 15.1302 CAD/CADD Drafting and/or Design Technology/Technician.** A program that prepares individuals to apply technical skills and advanced computer software and hardware to the creation of graphic representations and simulations in support of engineering projects. Includes instruction in engineering graphics, two-dimensional and three-dimensional engineering design, solids modeling, engineering animation, computer-aided drafting (CAD), computer-aided design (CADD), and auto-CAD techniques.
- 15.1303 Architectural Drafting and Architectural CAD/CADD.** A program that prepares individuals to apply technical knowledge and skills to develop working drawings and electronic simulations for architectural and related construction projects. Includes instruction in basic construction and structural design, architectural rendering, architectural-aided drafting (CAD), layout and designs, architectural blueprint interpretation, building materials, and basic structural wiring diagramming.
- 15.1304 Civil Drafting and Civil Engineering CAD/CADD.** A program that prepares individuals to apply technical knowledge and skills to develop working drawing and electronic simulations in support of civil engineers, geological engineers, and related professionals. Includes instruction in basic civil engineering principles, geological and seismographic mapping, machine drafting, computer-aided drafting (CAD), pipe drafting, survey interpretation, and blueprint reading.
- 15.1305 Electrical/Electronics Drafting and Electrical/Electronics CAD/CADD.** A program that prepares individuals to apply technical knowledge and skills to develop working schematics and representations in support of electrical/electronic engineers, computer engineers, and related professionals. Includes instruction in basic electronics, electrical systems and computer layouts; electrode-mechanical drafting; manufacturing circuitry; computer-aided drafting (CAD); and electrical systems specification interpretation.
- 15.1306 Mechanical Drafting and Mechanical Drafting CAD/CADD.** A program that prepares individuals to apply technical knowledge and skills to develop working drawings and electronic simulations in support of mechanical and industrial engineers, and related professionals. Includes instruction in manufacturing

materials and processes, mechanical drafting, electrode-mechanical drafting, basic metallurgy, geometric dimensioning and tolerancing, blueprint reading and technical communication.

- 15.1399 Drafting/Design Engineering Technologies/Technicians, Other.** Any instructional program in drafting/design engineering technologies not listed above.
- 15.1401 Nuclear Engineering Technology/Technician.** A program that prepares individuals to apply basic engineering, knowledge and technical skills in support of engineer and other professionals operating nuclear facilities and engaged in nuclear applications and safety procedures. Includes instruction in physics, nuclear science, nuclear systems, nuclear plant and systems design, radiological safety, radiological applications, and applicable law and regulations.
- 15.1501 Engineering/Industrial Management.** A program that focuses on the application of engineering principles to the planning and operational management of industrial and manufacturing operations, and prepares individuals to plan and manage such operations. Includes instruction in accounting, engineering economy, financial management, industrial and human resources management, industrial psychology, management information systems, mathematical modeling and optimization, quality control, operations research, safety and health issues, and environmental program management.
- 15.1502 Engineering Design.** An instructional program that prepares individuals to apply mathematical and scientific principles to engineering problems involving marrying or coordinating multiple dissimilar systems to carry out single functions or achieve common purposes, organizing system components for maximum flexibility and utility, planning engineering projects involving multiple tasks and design solutions, planning design testing and evaluation procedures, resolving specification and requirement conflicts, and choosing among competing theoretical solutions.
- 15.1503 Packaging Science.** A program that focuses on the application of scientific, technological, design, and business principles to the development of packages and packaging materials, including raw material production, conversion of raw materials into usable forms, design, distribution, and post-use recycling and reuse. Includes instruction in principles of packaging, materials sciences, distribution and transportation, engineering and technology, graphic design, packaging regulations, and business and marketing.
- 15.1599 Engineering-Related Fields, Other.** Any instructional program in engineering-related fields not listed above.
- 15.1601 Nanotechnology.** A program that prepares individuals to apply mathematical, scientific, and engineering principles and technical skills to manipulate matter at the atomic and molecular level (in the range of 1-100 nanometers) and to design, fabricate, and integrate nanoscale structures, devices, and systems. Includes instruction in materials science, thermodynamics, nanomaterials, nanoelectronics, and nano/micro device fabrication and testing.
- 15.9999 Engineering Technologies and Engineering-Related Fields, Other.** Any instructional program in engineering technologies and engineering-related fields not listed above.

#### **Biological and Medical Sciences 26.xxxx**

- 26.0101 Biology/Biological Sciences, General.** A general program of biology at the introductory, basic level or a program in biology or the biological sciences that is undifferentiated as to title or content. Includes instruction in general biology and programs covering a variety of biological specializations.
- 26.0102 Biomedical Sciences, General.** A general, program that focuses on the integrative scientific study of biological issues related to health and medicine, or a program in one or more of the biomedical sciences that is undifferentiated as to title. Includes instruction in any of the basic medical sciences at the research level; biological science research in biomedical faculties; and general studies encompassing a variety of the biomedical disciplines.
- 26.0202 Biochemistry.** A program that focuses on the scientific study of the chemistry of living systems, their fundamental chemical substances and reactions, and their chemical pathways and information transfer systems, with particular reference to carbohydrates, proteins, lipids, and nucleic acids. Includes instruction in bio-organic chemistry, protein chemistry, bioanalytical chemistry, bioseparations, regulatory biochemistry, enzymology, hormonal chemistry, calorimetry, and research methods and equipment operation.
- 26.0203 Biophysics.** A program that focuses on the application of physics principles to the scientific study the mechanisms of biological processes and assemblies at all levels of complexity. Includes instruction in research methods and equipment operation and applications to subjects such as bioenergetics, biophysical theory and modeling, electrophysics, membrane biology, channels, receptors and transporters, contractility and muscle function, protein shaping and folding, molecular and supramolecular structures and assemblies, and computational science.
- 26.0204 Molecular Biology.** A program that focuses on the scientific study of the structure and function of biological macromolecules and the role of molecular constituents and mechanisms in supramolecular assemblies and cells. Includes instruction in such topics as molecular signalling and transduction, regulation of cell growth, enzyme substrates and mechanisms of enzyme action, DNA-protein interaction, and applications to fields such as biotechnology, genetics, cell biology, and physiology.
- 26.0205 Molecular Biochemistry.** A program that focuses on the scientific relationship of physiological function to the structure and actions of macromolecules and supramolecular assemblies such as multienzyme complexes, membranes, and viruses. Includes instruction in the chemical mechanisms of regulation and catalysis, protein synthesis and other syntheses, and biomolecular chemical reactions.

- 26.0206 Molecular Biophysics.** A scientific program that focuses on the dynamics and interactions of macromolecules and other three-dimensional ultrastructures, the architecture of supramolecular structures, and energy transfer in biomolecular systems. Includes instruction in energy transduction, structural dynamics, mechanisms of electron and proton transfer in biological systems, bioinformatics, automated analysis, and specialized research techniques.
- 26.0207 Structural Biology.** A program that focuses on the scientific study of submolecular and molecular components and assemblies of living systems and how they are organized into functional units such as cells and anatomic tissues. Includes instruction in glycoprotein, carbohydrate, protein, and nucleic acid structures and chemistry; cytoskeletal structure; nuclear and intracellular structures; molecular recognition; molecular chaperones; transcription and folding; multicellular organization; microtubules and microfilaments; cell differentiation; immunophysics; and DNA sequencing.
- 26.0208 Photobiology.** A program that focuses on the scientific study of the effects of light energy on living organisms, the manufacture and processing of luminescence by organisms, and the uses of light in biological research. Includes instruction in bioluminescence, chronobiology, photomedicine, environmental photobiology, organic photochemistry, photomorphogenesis, photoreceptors and photosensitization, molecular mechanics of photosynthesis, phototechnology, vision, ultraviolet radiation, radiation physics, and spectral research methods.
- 26.0209 Radiation Biology/Radiobiology.** A program that focuses on the effects of radiation on organisms and biological systems. Includes instruction in particle physics, ionization, and biophysics of radiation perturbations, cellular and organismic repair systems, genetic and pathological effects of radiation, and the measurement of radiation dosages.
- 26.0299 Biochemistry, Biophysics and Molecular Biology, Other.** Any instructional program in biochemistry, biophysics and molecular biology not listed above.
- 26.0210 Biochemistry/Biophysics and Molecular Biology.** An integrated, combined program that focuses on the structure, function, and dynamic behavior of the components of biological systems at the submolecular, molecular, and supramolecular levels and their influence on biological activity at the cellular, tissue, organ, and organismic levels. Includes instruction in biochemistry, biophysics, structural biology, molecular biology, and research applications and methods appropriate to specific topics.
- 26.0301 Botany/Plant Biology.** A program that focuses on the scientific study of plants, related microbial organisms, and plant habitats and ecosystem relations. Includes instruction in plant anatomy and structure, phytochemistry, cytology, plant genetics, plant morphology and physiology, plant ecology, plant taxonomy and systematics, paleobotany, and applications of biophysics and molecular biology.
- 26.0305 Plant Pathology/Phytopathology.** A program that focuses on the scientific study of plant diseases and plant health, and the development of disease control mechanisms. Includes instruction in plant anatomy and physiology; pathogenesis; molecular plant virology; molecular genetics; bacterial epidemiology; causal agent identification; host/agent interactions; disease resistance and response mechanisms; developing plant disease treatments; disease prevention; and disease physiology and control.
- 26.0307 Plant Physiology.** A program that focuses on the scientific study of plant internal dynamics and systems, plant-environment interaction, and plant life cycles and processes. Includes instruction in cell and molecular biology; plant nutrition; plant respiration; plant growth, behavior, and reproduction; photosynthesis; plant systematics; and ecology.
- 26.0308 Plant Molecular Biology.** A program that focuses on the application of molecular biology, biochemistry, and biophysics to the study of biomolecular structures, functions, and processes specific to plants and plant substances. Includes instruction in the biochemistry of plant cells, nuclear-cytoplasmic interactions, molecular cytostructures, photosynthesis, plant molecular genetics, and the molecular biology of plant diseases.
- 26.0399 Botany/Plant Biology, Other.** Any instructional program in botany/plant biology not listed above.
- 26.0401 Cell/Cellular Biology and Histology.** A program that focuses on the scientific study of the structure, function, and regulation of cells as individual units and as components of larger systems. Includes instruction in cell chemistry, cellular dynamics, cellular replication and reproduction, cell anatomy, membrane function, organelles, cell adhesion and extracellular matrices, cell dynamics and motility, meiosis and mitosis, signal transduction, regulation, recognition and defense mechanisms, the cell cycle, cell metabolism and respiration, gene expression, and studies of cell types and characteristics.
- 26.0403 Anatomy.** A program that focuses on the scientific study of organ systems, tissue structures, and whole bodies together with their cellular and structural components and dynamics. Includes instruction in cell biology and histology, structural biology, molecular mechanics, regional and gross anatomy, embryology, neuroanatomy, endocrinology and secretory dynamics, and applications to such topics as aging and disease conditions.
- 26.0404 Developmental Biology and Embryology.** A program that focuses on the scientific study of embryology, development, and growth of animals and human beings. Includes instruction in fertilization, oogenesis, histogenesis, gastrulation, and cell differentiation; embryological development including organ and pattern formation, morphogenesis, gene regulation, cell lineage, and fate maps; disease and defect studies; transgenic and evolutionary models of growth and development; and applications to specific organisms and phyla.
- 26.0405 Neuroanatomy.** A program that focuses on the scientific study of structure and function of the brain and central nervous system. Includes instruction in the molecular biology of neural cells and circuits, cognitive

- biology, neural transmitters and receptors, neuronal signalling and control of physical function, membrane and synapse structure and communication, autonomic function, nervous system circuitry and mapping, anatomy of neurological disease and disorders, brain studies, protein chemistry, and computational biology.
- 26.0406 Cell/Cellular and Molecular Biology.** An integrated, combined program that focuses on the scientific study of cells, cellular systems, and the molecular basis of cell structure and function. Includes instruction in cell biology, cell chemistry, molecular biology, biophysics, and structural biology.
- 26.0407 Cell Biology and Anatomy.** An integrated, combined program that focuses on the scientific study of cell structure, function, and dynamics within the context of organismic, regional, and gross anatomical systems. Includes instruction in molecular biology, cell biology and histology, structural biology, anatomy, embryology, endocrinology, and applications to specific systems, diseases, defects, and processes.
- 26.0499 Cell/Cellular Biology and Anatomical Sciences, Other.** Any instructional program in cell/cellular biology and anatomical sciences not listed above.
- 26.0502 Microbiology, General.** A program that focuses on the scientific study of unicellular organisms and colonies, and subcellular genetic matter and their ecological interactions with human beings and other life. Includes instruction in microbial genetics, cell biology, cell physiology, virology, pathogenic microbiology, environmental microbiology, immunology, biostatistics, bioinformatics, and laboratory methods including microscopy.
- 26.0503 Medical Microbiology and Bacteriology.** A program that focuses on the scientific study of pathogenic bacteria that are significant factors in causing or facilitating human disease. Includes instruction in the pathogenesis of bacterial diseases, bacterial genetics and physiology, bacterial anatomy and structure, antigens, bacterial reproduction, bacterial adhesion, phagocytes, and the identification of new or mutated bacteria and bacterial agents.
- 26.0504 Virology.** A program that focuses on the scientific study of subcellular pieces of genetic material, called viruses, that inhabit living cells in parasitical relationships and their role in disease. Includes instruction in virus taxonomy and systematics, viral structures, viral genetics, prions, virus/host cell interaction, viral pathogenesis, and applications to specific topics such as cancer biology.
- 26.0505 Parasitology.** A program that focuses on the scientific study of biological organisms living in ecologically exploitative and competitive relationships with host organisms, and the role of parasites in causing injury, disease, and environmental damage. Includes instruction in vector biology, immunoparasitology, medical parasitology, molecular biology of parasitological associations, veterinary and comparative parasitology, chemotherapeutics, and ecological and systematic parasitology.
- 26.0506 Mycology.** A program that focuses on the scientific study of fungi, lichenous plants, eukaryotic microorganisms, myxomycetes, and plasmodiophorales and their relationship to diseases in higher plants, animals, and human beings as well as to pharmacologically useful products. Includes instruction in cell and molecular biology; histopathology; fungal growth and behavior; environmental mycology; antifungal sensitivity; mycoses; pathogens and pathogenesis; pharmacological properties; and computer and laboratory research methods.
- 26.0507 Immunology.** A program that focuses on scientific study of the biological mechanisms involved in the pathogenesis of disease, host-pathogen interactions, and host response to disease. Includes instruction in antigen and antibody structure and function, effector mechanisms, receptors, histocompatibility, host-pathogen recognition, disease modeling, autoimmune systems, antibody formation, cytotoxic responses, regulation of immune response, virulence determinants, intercellular signalling, immunosuppression, immunotherapy, immunogenetics, disease markers, transplantation, antibody humanization, and microbial pathogenesis.
- 26.0508 Microbiology and Immunology.** A program that focuses on the scientific study of the microorganisms that cause disease and the host immune response to them. Includes instruction in microbiology, microbial genetics, molecular virology, pathogenic bacteriology, disease mechanisms, immunology, immunogenetics, autoimmunity, and bioinformatics.
- 26.0599 Microbiological Sciences and immunology, Other.** Any instructional program in the microbiological sciences and immunology not listed above.
- 26.0701 Zoology/Animal Biology.** A general program that focuses on the scientific study of the biology of animal species and phyla, with reference to their molecular and cellular systems, anatomy, physiology, and behavior. Includes instruction in molecular and cell biology, microbiology, anatomy and physiology, ecology and behavior, evolutionary biology, and applications to specific species and phyla.
- 26.0702 Entomology.** A program that focuses on the scientific study of insect species and populations in respect of their life cycles, morphology, genetics, physiology, ecology, taxonomy, population dynamics, and environmental and economic impacts. Includes instruction in applicable biological and physical sciences as well as insect toxicology and the biochemical control of insect populations.
- 26.0707 Animal Physiology.** A program that focuses on the scientific study of function, morphology, regulation, and intercellular communications and dynamics within vertebrate and invertebrate in animal species, with comparative applications to homo sapiens and its relatives and antecedents. Includes instruction in reproduction, growth, lactation, digestion, performance, behavioral adaptation, sensory perception, motor action, phylogenetics, biotic and abiotic function, membrane biology, and related aspects of biochemistry and biophysics.
- 26.0708 Animal Behavior and Ethology.** A program that focuses on the scientific study of the psychological and neurological bases of animal sensation, perception, cognition, behavior, and behavioral interactions within

and outside the species. Includes instruction in ethology, behavioral neuroscience, neurobiology, behavioral evolution, cognition and sensory perception, motivators, learning and instinct, hormonal controls, reproductive and developmental biology, community ecology, functional behavior, and applications to specific behaviors and patterns as well as to specific phyla and species.

- 26.0709 Wildlife Biology.** A program that focuses on the application of biological principles to the study of vertebrate wildlife, wildlife habitats, and related ecosystems in remote and urban areas. Includes instruction in animal ecology; adaptational biology; urban ecosystems; natural and artificial habitat management; limnology; wildlife pathology; and vertebrate zoological specializations such as mammalogy, herpetology, ichthyology, ornithology, and others.
- 26.0799 Zoology/Animal Biology, Other.** Any instructional program in zoology/animal biology not listed above.
- 26.0801 Genetics, General.** A general program that focuses on the scientific study of the organization, recombination, function, regulation, and transmission of heritable information in biological organisms at all levels of complexity. Includes instruction in Mendelian genetics, mechanisms of gene regulation, chromosome structure and replication, epigenetic phenomena, DNA repair and recombination, sex determination, genetic interactions between genomes, and molecular evolution.
- 26.0802 Molecular Genetics.** A program that focuses on the scientific study of the molecular mechanisms regulating gene expression, information transfer, replication, and stability in DNA and RNA. Includes instruction in prokaryotic genetics and gene expression; development and evolution of gene sequences and anatomical forms; biochemistry of gene replication and recombination; transcription and processing; genomics; chromatin architecture; and DNA/RNA structure.
- 26.0803 Microbial and Eukaryotic Genetics.** A program that focuses on the scientific study of the genetics of viruses, infectious agents, organelles, nuclear genomes, eubacteria, archaeobacteria, and eukaryotic organisms. Includes instruction in molecular genetics and evolution; parasitic and symbiotic interaction at the genetic level; epigenetic phenomena; microbial interactions; and genomics.
- 26.0804 Animal Genetics.** A program that focuses on the scientific study of the genetics of multicellular animal life forms from the experimental, comparative, and clinical (veterinary and medical) viewpoints. Includes instruction in molecular genetics, gene expression, gene regulation, genomics, epigenetic phenomena, DNA recombination and repair, genetic interactions at the microbial and higher levels, and molecular evolution.
- 26.0805 Plant Genetics.** A program that focuses on the scientific study of the genetics of multicellular plants and fungi as related to botanical research as well as to applications in comparative genetics, ecology and evolutionary studies, clinical studies, and industrial research. Includes instruction in molecular genetics, gene expression, gene regulation, genomics, epigenetic phenomena, DNA recombination and repair, genetic interactions at the microbial and higher levels, and molecular evolution.
- 26.0806 Human/Medical Genetics.** A program that focuses on the scientific study of human genetics from the standpoint of medical applications such as clinical diagnosis, genetic engineering and therapy, transplantation, and the study of genetic diseases and disabilities and their defense. Includes instruction in human molecular genetics; genetic factors causing disease; changes in gene expression during development, differentiation, and pathogenesis; recombinant DNA; gene therapy; clinical genetics; genetic epidemiology; immunogenetics; cytogenetics; and genetics of specific disorders and diseases.
- 26.0807 Genome Sciences/Genomics.** A program that focuses on the scientific study of whole genome sequences and patterns of gene expression. Includes instruction in molecular and cellular biology, genetics, protein technologies, genomic sciences and techniques, bioinformatics, and scientific and research ethics.
- 26.0899 Genetics, Other.** Any instructional program in genetics not listed above.
- 26.0901 Physiology, General.** A general program that focuses on the scientific study of the functional dynamics, morphology, and biochemical and biophysical communications within organisms and between living systems at all levels of complexity and integration. Includes instruction in reproduction, growth, hormonal action, vascular function, respiration, digestion, sensory perception and processing, sensorimotor integration, signal encoding and conveyance, homeostasis, physical function and malfunction, evolutionary physiology, and disease processes.
- 26.0902 Molecular Physiology.** A program that focuses on the scientific study of dynamic interactive processes and biochemical communications at the subcellular level. Includes instruction in ion channels and transporters, molecular signalling pathways, endocrine control and regulation, genetic information transfer, homeostasis and molecular control systems, electrophysiology and sensory mechanisms, protein synthesis, and applicable research methods and technologies.
- 26.0903 Cell Physiology.** A program that focuses on the scientific study of physiological processes operating within and among cells, and intracellular communication and behavior, in the context of larger systems and whole organisms. Includes instruction in cell and molecular biology, molecular physiology, cell cycle control, signal transduction, protein structure, membrane biochemistry and structure, ion channel physics, cell respiration and digestion, secretory functions, cell adhesion and communication, information encoding and decoding, and the relation of cell physiology to tissue, organ, and organismic functioning.
- 26.0904 Endocrinology.** A program that focuses on the scientific study of the composition, manufacture, and secretion of protein compounds by cells and glands and the role of endocrine substances in bodily processes. Includes instruction in protein chemistry, protein secretion, membrane biogenesis and transfer methods, cellular communication, gene and cell regulation, cytochemistry, fractionation, radioautography, and applications such as neuroendocrinology.

- 26.0905 Reproductive Biology.** A program that focuses on the scientific study of reproductive processes and biogenesis in animals and human beings. Includes instruction in reproductive ecology and behavior, reproductive system physiology, endocrinology, developmental biology, neuroendocrinology, evolution and types of reproductive systems, reproductive genetics, physiopathology of reproductive processes, and applications of molecular biology and biophysics to the study of reproductive physiology.
- 26.0906 Neurobiology and Neurophysiology.** A program that focuses on the scientific study of the cellular and molecular basis of the lower and higher neural functions in animals and human beings, organ system behavior and the immune response, and the control of physiological systems. Includes instruction in computational biology, computer modeling, protein biochemistry, electrophysiology, morphological basis of behavior, neural signal transduction and reception, synaptic activity, neurotransmission, sensory perception and sensorimotor interaction, inflammation and neurodegeneration, neurological and autoimmune disease, immune response, maintenance of homeostasis, and autonomic function.
- 26.0907 Cardiovascular Science.** A program that focuses on the scientific study of the structure and functioning of the heart, vascular system, and blood in animals and human beings and the disorders and diseases associated with the cardiovascular system. Includes instruction in cardiovascular physiology, blood physiology, vasculature, vascular metabolism, neural control of cardiovascular function, microvascular permeability and membrane transport, cardiac contraction mechanisms, homeostasis, and applications to topics such as arteriosclerosis, heart disease, diabetes, vascular remodeling, transplantation, transfusion, and pacemakers and artificial organs.
- 26.0908 Exercise Physiology.** A program that focuses on the scientific study of the physiological processes involved in physical or motor activity, including sensorimotor interactions, response mechanisms, and the effects of injury, disease, and disability. Includes instruction in muscular and skeletal anatomy; molecular and cellular basis of muscle contraction; fuel utilization; neurophysiology of motor mechanics; systemic physiological responses (respiration, blood flow, endocrine secretions, and others); fatigue and exhaustion; muscle and body training; physiology of specific exercises and activities; physiology of injury; and the effects of disabilities and disease.
- 26.0909 Vision Science/Physiological Optics.** A program that focuses on the scientific study of vision, visual processes, and related phenomena and clinical research and treatment modalities. Includes instruction in ocular anatomy and physiology, microbiology of the eye, electrophysiology, neurophysiology, corneal physiology, photochemistry, psychophysics, visual biophysics and motor systems, sensory mechanisms and photoreception, eye circulation and metabolism, geometric and physical optics, ocular development across the life span, visual stimuli and perception, color vision, eye motility, biometrics and measurement techniques, visual pathology, and environmental issues.
- 26.0910 Pathology/Experimental Pathology.** A program that focuses on the scientific study of the expression, initiation, maintenance and progression of tissue injury and disease, including death, and the relationship of pathogenesis to fundamental molecular and cellular mechanisms. Includes instruction in immunology, microbiology, gene expression, inflammation, cell injury, apoptosis, immunopathology, molecular markers of disease and toxins, neoplasia, growth regulation, and organ- and system-specific investigations.
- 26.0911 Oncology and Cancer Biology.** A program that focuses on the scientific study of carcinogens; the onset of malignancy in cells, tissues, blood, and organs; the genetics of cancer; the anatomy and physiology of cancer cells; and the study of cancer behaviors and treatments. Includes instruction in gene expression; oncogenes and tumor suppressor genes; viral genes and cancer proliferation; regulation of signal transduction; cancer proteins; hormonal and growth factors in cancer cells; tumor promotion, progression, and metastasis; carcinogen receptors and metabolism; carcinogen ecology; immunological targeting; and studies of genetic, chemical, radiologic and other treatment therapies.
- 26.0912 Aerospace Physiology and Medicine.** A program that focuses on the scientific study of the physiological processes involved in low and high-altitude flight and living in space and related low-pressure and low-gravity environments, including sensorimotor interactions, response mechanisms, and the effects of injury, disease, and disability. Includes instruction in anatomy, molecular and cellular basis of muscle contraction, fuel utilization, neurophysiology of motor mechanics, systemic physiological responses (respiration, blood flow, endocrine secretions, and others), fatigue and exhaustion, systemic environmental pathologies, muscle and body training, physiology of specific exercises and activities, physiology of injury, and the effects of disabilities and disease.
- 26.0999 Physiology, Pathology, and Related Sciences, Other.** Any instructional program in physiology, pathology, and related sciences not listed above.
- 26.1001 Pharmacology.** A program that focuses on the scientific study of drug interactions on biological systems and organisms and the sources, chemical properties, biological effects, and therapeutic uses of drugs. Includes instruction in pharmacodynamics, pharmacokinetics, toxicology, drug therapeutics, drug action, bodily responses to drug events, biochemical proliferation and differentiation, apoptosis, cell biology, medicinal chemistry, and studies of specific drugs and drug interactions. (Moved from 26.0705)
- 26.1002 Molecular Pharmacology.** A program that focuses on the scientific study of the biochemical and biophysical characteristics of drugs at the molecular level and their interaction with, and effects on, biological macromolecules and cellular structures and processes. Includes instruction in molecular biology and biophysics; pharmacology of signal transduction, transmitters, and protein synthesis and release; receptors, protein interaction and binding; drug discovery and recognition; molecular toxicology; drug design; pharmacodynamics; developmental genetics; and studies of therapeutic strategies.

- 26.1003 Neuropharmacology.** A program that focuses on the scientific study of drugs that modify the function of the brain and central nervous system, the effects of such drugs on health, disease, perception, motor action, and behavior; and the development of countermeasures and treatment therapies. Includes instruction in neuroanatomy, neurophysiology, behavioral neuroscience, neurobiochemistry, neuropathology, the mechanisms of brain function, medicinal chemistry, pharmaceuticals, and studies of specific drugs and drug therapies.
- 26.1004 Toxicology.** A program that focuses on the scientific study of poisons and other biohazards; their interactions with organisms and their food and respiratory systems; and their prevention, management, and counteraction. Includes instruction in toxicological biochemistry, toxic agents and transporters, toxin fate, toxicokinetics and metabolism, toxin classification, molecular toxic mechanisms, extracellular matrices and cell function, bacterial pathogenesis and mutagenesis, pathophysiology and apoptosis, cell stress and injury, studies of specific toxins, and studies of specific organ systems and physiological functions in relation to toxicological problems. (Moved from 26.0612)
- 26.1005 Molecular Toxicology.** A program that focuses on the scientific study of the genetic determinants of susceptibility to external pollutants and poisons; the interaction of toxic agents with biological systems at the molecular and cellular levels; and the development of countermeasures and treatments. Includes instruction in pharmacogenetics, biomolecular structure, gene expression and regulation, transgenic modeling, toxic events signalling, transcriptional activation, mutagenesis and carcinogenesis, pulmonary toxicology, xenobiotic metabolism, oxidative stress, risk assessment, molecular dosimetry, and studies of specific toxins and treatment therapies.
- 26.1006 Environmental Toxicology.** A program that focuses on the scientific study of the health effects associated with exposure to toxic chemicals and systems occurring in the natural, work, and living environments; the management of environmental toxins and toxicity; and the development of protections for humans, animals, and plants. Includes instruction in applied ecology; microbiology; toxin transport, fate, and degradation; dermal toxicology; reproductive and genetic toxicology; atmospheric and environmental chemistry; metals toxicology; environmental mutagens and biotransformation; nutrient interaction; chemical sensitivity, disorders, and disease; risk assessment; animal waste management; environmental health; and hazardous materials management.
- 26.1007 Pharmacology and Toxicology.** A program with an integrated, combined approach to the study of pharmacological and toxicological issues in biology and the biomedical sciences. Includes instruction in topics such as solvents, xenobiotic metabolism, chemical toxicity, neurotoxicology, immunopharmacology, biotransformation, tissue culture and in vitro studies, biomolecular analysis, bioactivation and inactivation, enzyme regulation, chemoprevention and chemotherapy, industrial and chemical studies, radiation health, and bioinformatics.
- 26.1099 Pharmacology and Toxicology, Other.** Any instructional program in pharmacology and toxicology not listed above.
- 26.1101 Biometry/Biometrics.** A program that focuses on the application of statistics and other computational methods to the study of problems in the biological sciences and related fields in agriculture and natural resources. Includes instruction in computational biology, mathematical statistics, matrix algebra, applied calculus, experimental design, linear modeling, sampling theory, stochastic processes, spatial and temporal analysis, longitudinal analysis, sparse/unbalanced data and complex error, and applications to such topics as population genetics, animal breeding, forest genetics, population dynamics, wildlife biometry, ecology, and agricultural and natural resource management.
- 26.1102 Biostatistics.** A program that focuses on the application of descriptive and inferential statistics to biomedical research and clinical, public health, and industrial issues related to human populations. Includes instruction in mathematical statistics, modeling, clinical trials methodology, disease and survival analysis, longitudinal analysis, missing data analysis, spatial analysis, computer tomography, biostatistics consulting, and applications to such topics as genetics, oncology, pharmacokinetics, physiology, neurobiology, and biophysics.
- 26.1103 Bioinformatics.** A program that focuses on the application of computer-based technologies and services to biological, biomedical, and biotechnology research. Includes instruction in algorithms, network architecture, principles of software design, human interface design, usability studies, search strategies, database management and data mining, digital image processing, computer graphics and animation, CAD, computer programming, and applications to experimental design and analysis and to specific quantitative, modeling, and analytical studies in the various biological specializations.
- 26.1104 Computational Biology.** A program that focuses on computational theoretical approaches to understanding biological systems, including computational models of biological processes, computational management of large-scale projects, database development and data-algorithm development, and high-performance computing, as well as statistical and mathematical analyses.
- 26.1199 Biomathematics, Bioinformatics, and Computational Biology, Other.** Any instructional program in biomathematics, bioinformatics, and computational biology not listed above.
- 26.1201 Biotechnology.** A program that focuses on the application of the biological sciences, biochemistry, and genetics to the preparation of new and enhanced agricultural, environmental, clinical, and industrial products, including the commercial exploitation of microbes, plants, and animals. Includes instruction in bioinformatics, gene identification, phylogenetics and comparative genomics, bioinorganic chemistry, immunoassaying, DNA sequencing, xenotransplantation, genetic engineering, industrial microbiology, drug

and biologic development, enzyme-based production processes, patent law, biotechnology management and marketing, applicable regulations, and biotechnology ethics. (Moved from 26.0616)

- 26.1301 Ecology.** A program that focuses on the scientific study of the relationships and interactions of small-scale biological systems, such as organisms, to each other, to complex and whole systems, and to the physical and other non-biological aspects of their environments. Includes instruction in biogeochemistry; landscape and/or marine/aquatic dynamics; decomposition; global and regional elemental budgets; biotic and abiotic regulation of nutrient cycles; ecophysiology; ecosystem resilience, disturbance, and succession; community and habitat dynamics; organismal interactions (co-evolution, competition, predation); paleoecology, and evolutionary ecology.
- 26.1302 Marine Biology and Biological Oceanography.** A program that focuses on the scientific study of the ecology and behavior of microbes, plants, and animals inhabiting oceans, coastal waters, and saltwater wetlands and their interactions with the physical environment. Includes instruction in chemical, physical, and geological oceanography; molecular, cellular, and biochemical studies; marine microbiology; marine botany; ichthyology; mammalogy; marine population dynamics and biodiversity; reproductive biology; studies of specific species, phyla, habitats, and ecosystems; marine paleoecology and palentology; and applications to fields such as fisheries science and biotechnology.
- 26.1303 Evolutionary Biology.** A program that focuses on the scientific study of the genetic, developmental, functional, and morphological patterns and processes, and theoretical principles; and the emergence and mutation of organisms over time. Includes instruction in molecular and morphological systematics; genetics and development; evolutionary transformation; paleobiology and paleontology; morphogenesis; mutation; locomotor, biomechanical and craniodental form and function; evolutionary theory; and systematic biology.
- 26.1304 Aquatic Biology/Limnology.** A program that focuses on the scientific study of the ecology and behavior of microbes, plants, and animals inhabiting inland fresh waters such as lakes, ponds, rivers, creeks, estuaries, and wetlands. Includes instruction in geology and hydrology; aquatic ecosystems; microbiology; mycology; botany; ichthyology; mammalogy; population biology and biodiversity; studies of specific species, phyla, and habitats; and applications to fields such as natural resources conservation, fisheries science, and biotechnology.
- 26.1305 Environmental Biology.** A program that focuses on the scientific study of the origins, functions, relationships, interactions, and natural history of living populations, communities, species, and ecosystems in relation to dynamic environmental processes. Includes instruction in biodiversity, molecular genetic and genomic evolution, mesoscale ecology, computational biology and modeling, conservation biology, local and global environmental change, and restoration ecology.
- 26.1306 Population Biology.** A program that focuses on the scientific study of the natural history, life cycle behavior, and ecosystem dynamics of single species and multi-species communities, and the patterns and causes of diversity within and among such populations. Includes instruction in biostatistics, population dynamics, population and quantitative genetics, RNA and DNA sequences, genomics, evolutionary ecology, natural adaptation and hybridization, geographic differentiation, life history and life cycle studies, and animal and plant demography.
- 26.1307 Conservation Biology.** A program that focuses on the application of the biological sciences to the specific problems of biodiversity, species preservation, ecological sustainability, and habitat fragmentation in the face of advancing human social, economic, and industrial pressures. Includes instruction in ecology, environmental science, biological systems, extinction theory, human-animal and human-plant interaction, ecosystem science and management, wetland conservation, field biology, forest and wildlife biology, and natural history.
- 26.1308 Systematic Biology/Biological Systematics.** A program that focuses on the theoretical and empirical study of the principles and processes underlying the origin and maintenance of biological taxonomic diversity; related biogeographical and evolutionary patterns; and studies of the origin, diversification, distribution, and extinction of species and lineages. Includes instruction in phylogenetic analysis, structural development and molecular evolution, classification and taxonomic theory, biological nomenclature, taxonomic assignment, evolutionary theory, biological surveys and inventories, computer modeling, and database building.
- 26.1309 Epidemiology.** A program that focuses on the scientific study of disease, disability, and trauma patterns within and across populations and the development of health management mechanisms to prevent and control disease outbreaks and injurious behaviors. Includes instruction in biostatistics, biochemistry, molecular biology, immunology, disease and injury determinants, genetic disease and disability factors, behavioral studies, health services research, environmental disease and injury factors, and population studies.
- 26.1310 Ecology and Evolutionary Biology.** A program that focuses on the scientific study of the relationships and interactions across levels of biological organization--genes and genomes, organisms, species, and ecosystems--and how these change over time, including the origins and history of species, the processes by which biodiversity has evolved, and the ecological context in which this evolution takes place. Includes instruction in animal, plant, population, functional, evolutionary, and ecosystem ecology; ecological and evolutionary genetics; molecular evolution; population and conservation biology; animal and plant diversity; biometry; and scientific and research ethics.
- 26.1399 Ecology, Evolution, Systematics and Population Biology, Other.** Any instructional program in ecology, evolution, and systematics not listed above.

- 26.1401** **Molecular Medicine.** A program that focuses on the scientific study of the molecular and cellular basis of disease, and the application of this knowledge to the development of new clinical and diagnostic tools, medications, and therapies. Includes instruction in cell biology, molecular biology, physiology, pharmacology, biochemistry, genetics, pathology, molecular immunology, research and quantitative methods, and biomedical research computing.
- 26.1501** **Neuroscience.** A program that focuses on the interdisciplinary scientific study of the molecular, structural, physiologic, cognitive, and behavioral aspects of the brain and nervous system. Includes instruction in molecular and cellular neuroscience, brain science, anatomy and physiology of the central nervous system, molecular and biochemical bases of information processing, behavioral neuroscience, biology of neuropsychiatric disorders, and applications to the clinical sciences and biomedical engineering.
- 26.1502** **Neuroanatomy.** A program that focuses on the scientific study of the structure of the central and peripheral nervous system in vertebrates or the nervous system of invertebrates. Includes instruction in cellular and circuit anatomy, mapping of neuronal pathways, anatomical distribution and mapping of neuronal signaling molecules and their receptors, and the anatomical basis of central nervous system diseases and disorders.
- 26.1503** **Neurobiology and Anatomy.** A program that focuses on the scientific study of the structure and function of the central and peripheral nervous system in vertebrates and invertebrates. Includes instruction in molecular and cellular studies of neuronal and glial cells and circuits, neural transmitters and receptors, neuronal signaling processes, membrane and synapse structure and communication, autonomic function, nervous system circuitry and mapping, and anatomical and functional basis of central nervous system diseases and disorders.
- 26.1504** **Neurobiology and Behavior.** A program that focuses on the scientific study of the structure and function of the central and peripheral nervous system in vertebrates and invertebrates as it relates to control of behavior. Includes instruction in neuronal systems and circuits, higher level studies of behavior and cognition, computational neurobiology, and behavioral manifestations of central nervous system diseases and disorders.
- 26.1599** **Neurobiology and Neurosciences, Other.** Any instructional program in neurobiology and neurosciences not listed above.
- 26.9999** **Biological and Biomedical Sciences, Other.** Any instructional program in the biological and biomedical sciences not listed above.

#### **Mathematics and Statistics 27.xxxx**

- 27.0101** **Mathematics, General.** A general program that focuses on the analysis of quantities, magnitudes, forms, and their relationships, using symbolic logic and language. Includes instruction in algebra, calculus, functional analysis, geometry, number theory, logic, topology and other mathematical specializations.
- 27.0102** **Algebra and Number Theory.** A program that focuses on the expression of quantities and their relationships by means of symbols, vectors, matrices, and equations, and the properties of integers. Includes instruction in algebraic structures, quadratic and automorphic forms, combinatorics, linear algebra, and algebraic geometry.
- 27.0103** **Analysis and Functional Analysis.** A program that focuses on the properties and behavior of equations, multivariate solutions, functions, and dynamic systems. Includes instruction in differential equations, variation, approximations, complex variables, integrals, harmonic analysis and wavelet theory, dynamic systems, and applications to mathematical physics.
- 27.0104** **Geometry/Geometric Analysis.** A program that focuses on the properties, measurements, and relationships pertaining to points, lines, angles, surfaces, and solids. Includes instruction in global analysis, differential geometry, Euclidian and Non-Euclidian geometry, set theory, manifolds, integral geometry, and applications to algebra and other topics.
- 27.0105** **Topology and Foundations.** A program that focuses on the properties of unaltered geometric configurations under conditions of continuous, multi-directional transformations. Includes instruction in mathematical logic, proof theory, model theory, set theory, combinatorics, continua, homotopy, homology, links, and transformation actions.
- 27.0199** **Mathematics, Other.** Any program in mathematics not listed above.
- 27.0301** **Applied Mathematics.** A program that focuses on the application of mathematics and statistics to the solution of functional problems in fields such as engineering and the applied sciences. Includes instruction in natural phenomena modeling continuum mechanics, reaction-diffusion, wave propagation, dynamic systems, numerical analysis, controlled theory, asymptotic methods, variation, optimization theory, inverse problems, and applications to specific scientific and industrial topics.
- 27.0303** **Computational Mathematics.** A program that focuses on the application of mathematics to the theory, architecture, and design of computers, computational techniques, and algorithms. Includes instruction in computer theory, cybernetics, numerical analysis, algorithm development, binary structures, combinatorics, advanced statistics, and related topics.

- 27.0304** **Computational and Applied Mathematics.** A program that focuses on the application of a broad range of mathematical and computational methods to modeling, analysis, algorithm development, and simulation for the solution of complex scientific and engineering problems. Includes instruction in numerical analysis, discrete mathematics, operations research, optimization, differential equations, statistics, scientific computation, and applications to specific scientific and industrial topics.
- 27.0305** **Financial Mathematics.** A program that focuses on the application of mathematics and statistics to the finance industry, including the development, critique, and use of various financial models. Includes instruction in probability theory, statistical analysis, numerical methods, computation and simulation methods, stochastic processes, economics, and financial markets and applications.
- 27.0306** **Mathematical Biology.** A program that focuses on the application of mathematics to genomics, molecular modeling, structural biology, ecology, evolutionary biology and systems of analysis of neurobiology, physiology, and metabolism. Includes instruction in computational mathematics, chaos and nonlinear systems, perturbation methods, evolutionary biology, molecular biology, bioinformatics, and neurobiology.
- 27.0399** **Applied Mathematics, Other.** Any instructional program in applied mathematics not listed above.
- 27.0501** **Statistics, General.** A general program that focuses on the relationships between groups of measurements, and similarities and differences, using probability theory and techniques derived from it. Includes instruction in the principles in probability theory, binomial distribution, regression analysis, standard deviation, stochastic processes, Monte Carlo method, Bayesian statistics, non-parametric statistics, sampling theory, and statistical techniques.
- 27.0502** **Mathematical Statistics and Probability.** A program that focuses on the mathematical theory underlying statistical methods and their use. Includes instruction in probability theory parametric and non-parametric inference, sequential analysis, multivariate analysis, Bayesian analysis, experimental design, time series analysis, resampling, robust statistics, limit theory, infinite particle systems, stochastic processes, martingales, Markov processes, and Banach spaces.
- 27.0503** **Mathematics and Statistics.** A program with a general synthesis of mathematics and statistics or a specialization which draws from mathematics and statistics. Includes instruction in calculus, linear algebra, numerical analysis and partial differential equations, discrete mathematics, probability theory, statistics, computing, and other related topics.
- 27.0599** **Statistics, Other.** Any instructional program in statistics not listed above.
- 27.9999** **Mathematics and Statistics, Other.** Any instructional program in mathematics and statistics not listed above.

#### **Military Science and Operational Studies 28.05xx**

- 28.0501** **Air Science/Airpower Studies.** A program that focuses on the theory, doctrine and principles of airpower in the tactical and strategic contexts, as well as in conjunction with other armed forces. Includes instruction in air warfighting, leadership and ethics, national security decisionmaking, strategic studies, global security, joint and coalition operations, and applicable regional or cultural studies and research methods.
- 28.0502** **Air and Space Operational Art and Science.** A program that focuses on the principles and art of leading, managing, and conducting air force operations on the ground, in the air, and in space. Includes instruction in leadership, staff operations, principles of command, air and space warfare, expeditionary operations, campaign planning, tactics and strategy. This CIP code is not valid for IPEDS reporting.
- 28.0505** **Naval Science and Operational Studies.** A program that focuses on in-depth professional study of naval warfare and related combined/joint operations at the tactical, operational and strategic levels. Includes instruction in maritime security, naval warfighting, naval tactics, naval strategy, operational art, planning and conducting joint operations, command and control, civil-military relations, information networking, leadership, ocean and nearshore operations, and related subjects.

#### **Military Technologies and Applied Sciences 29.xxxx**

- 29.0201** **Intelligence, General.** A program that focuses on the principles and techniques of intelligence acquisition, analysis and exploitation. Includes instruction in intelligence organizations, the intelligence cycle, intelligence operations planning, intelligence analysis and reporting, intelligence methods, electronic and signals intelligence, operations and communications security, human intelligence management, intelligence chain of command, information exploitation and psychological warfare, and the relationship to national security policy and strategy.
- 29.0202** **Strategic Intelligence.** A program that focuses on the management, analysis and use of national-level, theatre-level, and international intelligence and related policy issues. Includes instruction in intelligence organization and management, strategic uses of intelligence, management of intelligence systems and assets, command and control, joint intelligence operations, electronic and signals intelligence, threat assessment and estimation, intelligence analysis and reporting, counterintelligence, and studies of specific regions and situations.
- 29.0203** **Signal/Geospatial Intelligence.** A program that focuses on the theory, technology and operational aspects of collecting, processing and exploiting remote-sensed, radar, acoustic and other forms of signals intelligence. Includes instruction in applied physics, wave propagation and capture, radar systems,

acoustics and underwater systems, infrared systems, synthetic aperture systems, collection and processing systems, signal phenomenology, signal analysis and exploitation, and applications to specific intelligence problems.

- 29.0204 Command & Control (C3, C4I) Systems and Operations.** A program that focuses on the theory, technology and operational use of information and decision systems in support of battlefield, theatre, and global strategic operations. Includes instruction in applied mathematics and statistics, computer systems, real-time analysis and decision systems, surveillance and navigation systems, information and communications technology, information security, situational awareness, system integration, joint operations and applications to specific command problems and services.
- 29.0205 Information Operations/Joint Information Operations.** A program that focuses on the strategic and operational use of information relative to the support of military and strategic policy and objectives. Includes instruction in information technology, decision theory and applications, military operations, command and control technology, network operations, network systems integration, computer network defense, space communications technology, and applications to specific military operational tasks.
- 29.0206 Information/Psychological Warfare and Military Media Relations.** A program that focuses on the support of military and strategic operations and policy via the use of information as a tool of statecraft and warfighting. Includes instruction in information technology and systems, information security, command and control, satellite communications, global information dissemination, communications and media management, intelligence, psychological warfare, strategic planning, security policy and doctrine, and applications to specific operations, services, and scenarios.
- 29.0207 Cyber/Electronic Operations and Warfare.** A program that focuses on the technological and operation aspects of information warfare, including cyber attack and cyber defense. Includes instruction in computer and network security, cryptography, computer forensics, systems security engineering, software applications, threat and vulnerability assessment, wireless networks and satellite communications, tactical and strategic planning, legal and ethical issues, and cyber warfare systems development and acquisition.
- 29.0299 Intelligence, Command Control and Information Operations.** Any instructional program in intelligence, command control and information operations not listed above.
- 29.0301 Combat Systems Engineering.** A program that focuses on the application of systems engineering and system architecture to the design and construction of modern combat systems and their integration with each other, with host platforms and with other forces into network-centric warfighting systems. Includes instruction in systems engineering, computer programming, chemical systems, biological systems, material systems, human factors, combat environments, sensor systems, threat and system risk assessment, conventional and unconventional weapons, combat simulation, reliability and maintenance, testing, engineering project management, strategic planning and applications to aerospace, ground, and naval combat systems.
- 29.0302 Directed Energy Systems.** A program that focuses on the study of lasers and other directed energy phenomena and their application to the creation of energy beam weapons systems. Includes instruction in photonics, electro-optics, microwave phenomena, laser chemistry, spectroscopy, chemical lasers, fibre lasers, imaging and optics, laser propagation and control, laser communication, infrared remote sensing, modeling and simulation, and related technologies.
- 29.0303 Engineering Acoustics.** A program that focuses on the application of acoustics and signals processing to undersea and antisubmarine warfare. Includes instruction in acoustics; electrical engineering; the generation, propagation and reception of underwater sound waves; military applications of underwater sound; and acoustic signal processing.
- 29.0304 Low-Observables and Stealth Technology.** A program that focuses on the application of electromagnetic field theory, electro-optics and materials science to the reduction of radar, optical and acoustic signatures of weapons systems. Includes instruction in computational electromagnetics, electro-optics, acoustics, guided wave theory, radiation capture, antenna applications in layered environments, material characterization, radar cross-section analysis, sonar signature analysis, non-destructive testing, remote sensing, and applications to specific weapons systems and operational environments.
- 29.0305 Space Systems Operations.** A program that focuses on the design, development, and operation of missiles, satellites and other space-based systems for military purposes. Includes instruction in the military applications of space, space technology, aerospace engineering, systems architecture, orbital mechanics, launch and retrieval systems, ground support systems, satellite communications, and space-based sensor systems.
- 29.0306 Operational Oceanography.** A program that focuses on the study of physical oceanography as applied to the naval tactical and strategic environment and the support of military operations. Includes instruction in atmospheric thermodynamics and radiation propagation, air-ocean fluid dynamics, ocean waves, nearshore environments and processes, ocean acoustics, ocean analysis, tactical oceanography, prediction, and related quantitative and experimental methods.
- 29.0307 Undersea Warfare.** A program that focuses on the principles, engineering design and military concepts that govern the operational employment of underwater sensors and weapons systems. Includes

instruction in acoustics, electrical, and mechanical engineering; mathematics; meteorology; oceanography; physics; operations analysis; human factors; computer science; and robotics.

- 29.0399 Military Applied Sciences, Other.** Any instructional program in military applied sciences not listed above.
- 29.0401 Aerospace Ground Equipment Technology.** A program that focuses on the principles, technology, and maintenance of ground-based systems and equipments used to support aviation flight operations and space operations. Includes instruction in computer science, electronics, basic sciences and quantitative methods, air conditioning and refrigeration, corrosion control, fluid power, hazardous materials, industrial safety, maintenance management, vehicle and equipment operation, and applications to specific ground support systems.
- 29.0402 Air and Space Operations Technology.** A program that focuses on the principles, technology and maintenance of systems and equipment used in aerospace operations. Includes instruction in astronomy and astronautics, solid state theory, air and space operations, electronics, computer science, aviation and space flight safety, life support systems, flight operations management systems, programming, propulsion systems, weaponry, maintenance management and applications to specific systems and operations.
- 29.0403 Aircraft Armament Systems Technology.** A program that focuses on the principles, technology and maintenance of aircraft weapons systems and associated peripherals. Includes instruction in basic science and quantitative methods, computer science, electronics, engineering graphics, fluid power, heavy equipment operation, armament systems, weapon materials and processes, weapon safety, corrosion control, aircraft systems maintenance, and maintenance management.
- 29.0404 Explosive Ordinance/Bomb Disposal.** A program that focuses on the identification, containment, analysis and neutralization of explosive devices. Includes instruction in nuclear science, computer science, ordinance and bomb systems, electronics, computer science, industrial radiography, non-destructive testing, equipment operation, inventory management, investigative techniques, forensics, schematic interpretation, safety procedures, site containment and emergency medicine.
- 29.0405 Joint Command/Task Force (C3, C4I) Systems.** A program that focuses on the principles, technology and operational use of command and control (C3, C4I) systems as applied to joint and combined military operations involving unified commands. Includes instruction in information technology, communications systems, network systems and architecture, systems engineering, C3 and C4I doctrine and policy, C3 and C4I systems management, intelligence, operational and strategic planning, interagency operations, operational security and deception.
- 29.0406 Military Information Systems Technology.** A program that focuses on the principles, design and application of computer and networking technology to the military environment. Includes instruction in planning; program development; graphical user interfaces; rapid prototyping; program construction; data types, operations; control flow; arrays; records; file I/O; database access; event-driven OOP structures; and enabling global-networked communications, including databases, systems analysis and design, decision support systems, and network security.
- 29.0407 Missile and Space Systems Technology.** A program that focuses on the principles, technology and maintenance of rocket systems, guided missiles, and space vehicles as well as related systems. Includes instruction in engineering mechanics, engineering graphics, materials and processes, electronics, propellant and guidance systems, control systems, fluid power, nuclear and conventional weapons systems, hazardous materials, non-destructive inspection and testing, quality assurance, safety procedures and maintenance management.
- 29.0408 Munitions Systems/Ordinance Technology.** A program that focuses on the principles, technology and maintenance of ground or sea-based weapons systems, ordinance and munitions. Includes instruction in basic sciences, electronics, systems technology, fluid power, computer science, conventional weapons systems, nuclear weapons systems, munitions systems, storage and safety, equipment operation, guidance and control systems, hazardous materials, corrosion control, nondestructive testing and quality control, and maintenance management.
- 29.0409 Radar Communications and Systems Technology.** A program that focuses on the principles, technology and maintenance of air, sea and ground-based radar systems. Includes instruction in electronic principles and digital techniques, transistors and solid-state component theory, radar systems; maintenance technology, data processing systems, wiring and circuit schematics, maintenance management, safety procedures, and applications to specific systems and services.
- 29.0499 Military Systems and Maintenance Technology, Other.** Any instructional program in military systems and maintenance technology not listed above.
- 29.9999 Military Technologies and Applied Sciences, Other.** Any instructional program in military technologies and applied sciences not listed above.

### Multi/Interdisciplinary Studies 30.xxxx

- 30.0101 Biological and Physical Sciences.** A program that is either a general synthesis of one or more of the biological and physical sciences, or a specialization which draws from the biological and physical sciences.
- 30.0601 Systems Science and Theory.** A program with a multidisciplinary approach to the analysis and solution of complex problems, requiring a combined approach using data and models from the natural, social, technological, behavioral and life sciences, and other specialized fields.
- 30.0801 Mathematics and Computer Science.** A program with a general synthesis of mathematics and computer science or a specialization which draws from mathematics and computer science.
- 30.1001 Biopsychology.** A program that focuses on biological and psychological linkages, especially the linkages between biochemical and biophysical activity and the functioning of the central nervous system.
- 30.1701 Behavioral Sciences.** A program with a combined or undifferentiated focus on the social sciences, psychology, and biomedical sciences to study complex problems of human individual and social growth and behavior.
- 30.1801 Natural Sciences.** A program with a combined or undifferentiated focus on one or more of the physical and biological sciences.
- 30.1901 Nutrition Sciences.** A scientific program that focuses on the utilization of food for human growth and metabolism, in both normal and dysfunctional states, from the interdisciplinary perspective of the agricultural, human, biological, and biomedical sciences. Includes instruction in food science, biochemistry, physiology, dietetics, food and nutrition studies, biotechnology, biophysics, and the clinical sciences.
- 30.2501 Cognitive Science.** A program that focuses on the study of the mind and the nature of intelligence from the interdisciplinary perspectives of computer science, philosophy, mathematics, psychology, neuroscience, and other disciplines. Includes instruction in mathematics and logic, cognitive process modeling, dynamic systems, learning theories, brain and cognition, neural networking, programming, and applications to topics such as language acquisition, computer systems, and perception and behavior.
- 30.2701 Human Biology.** An interdisciplinary program that focuses on understanding the human being from the biological, social science, and humanities perspectives and that addresses contemporary issues related to biology and society, such as global health and disease, environmental policy, bioethics, and biotechnology.
- 30.3001 Computational Science.** A program that focuses on the study of scientific computing and its application. Includes instruction in scientific visualization, multi-scale analysis, grid generation, data analysis, applied mathematics, numerical algorithms, high performance parallel computing, and numerical modeling and simulation with applications in science, engineering and other disciplines in which computation plays an integral role.
- 30.3101 Human Computational Interaction.** An interdisciplinary program that focuses on the study of the interaction between people and technology and how that technology impacts society, and combines disciplines within the fields of computing and information science (information systems, software engineering, artificial intelligence and design) and the behavior sciences (cognitive science, cognitive psychology, sociology, organizational psychology, and social psychology). Includes instruction in information technology, cognitive and behavioral sciences, and systems design.
- 30.3201 Marine Sciences.** A program that focuses on the study of biology, chemistry, geology and physics applied to marine, estuarine and coastal environments. Includes instruction in marine biogeochemistry, atmosphere and ocean dynamics, coastal ecology, coastal ocean processes, microbial ecology, marine ecosystem modeling, and polar microbiology.
- 30.3301 Sustainability Studies.** A program that focuses on the concept of sustainability from an interdisciplinary perspective. Includes instruction in sustainable development, environmental policies, ethics, ecology, landscape architecture, city and regional planning, economics, natural resources, sociology, and anthropology.

### Physical Sciences 40.xxxx

- 40.0101 Physical Sciences.** A program that focuses on the major topics, concepts, processes, and interrelationships of physical phenomena as studied in any combination of physical science disciplines.
- 40.0201 Astronomy.** A general program that focuses on the planetary, galactic, and stellar phenomena occurring in outer space. Includes instruction in celestial mechanics, cosmology, stellar physics, galactic evolution, quasars, stellar distribution and motion, interstellar medium, atomic and molecular constituents of astronomical phenomena, planetary science, solar system evolution, and specific methodologies such as optical astronomy, radioastronomy, and theoretical astronomy.
- 40.0202 Astrophysics.** A program that focuses on the theoretical and observational study of the structure, properties, and behavior of stars, star systems and clusters, stellar life cycles, and related phenomena. Includes instruction in cosmology, plasma kinetics, stellar physics, convection and non-equilibrium radiation transfer theory, non-Euclidean geometries, mathematical modeling, galactic structure theory, and relativistic astronomy.
- 40.0203 Planetary Astronomy and Science.** A program that focuses on the scientific study of planets, small objects, and related gravitational systems. Includes instruction in the structure and composition of planetary surfaces and interiors, planetary atmospheres, satellites, orbital mechanics, asteroids and comets, solar system evolution and dynamics, planetary evolution, gravitational physics, and radiation physics.

- 40.0299 Astronomy and Astrophysics, Other.** Any instructional program in astronomy and astrophysics not listed above.
- 40.0401 Atmospheric Sciences and Meteorology, General.** A general program that focuses on the scientific study of the composition and behavior of the atmospheric envelopes surrounding the earth, the effect of earth's atmosphere on terrestrial weather, and related problems of environment and climate. Includes instruction in atmospheric chemistry and physics, atmospheric dynamics, climatology and climate change, weather simulation, weather forecasting, climate modeling and mathematical theory; and studies of specific phenomena such as clouds, weather systems, storms, and precipitation patterns.
- 40.0402 Atmospheric Chemistry and Climatology.** A program that focuses on the scientific study of atmospheric constituents, reactions, measurement techniques, and processes in predictive, current, and historical contexts. Includes instruction in climate modeling, gases and aerosols, trace gases, aqueous phase chemistry, sinks, transport mechanisms, computer measurement, climate variability, paleoclimatology, climate diagnosis, numerical modeling and data analysis, ionization, recombination, photoemission, and plasma chemistry.
- 40.0403 Atmospheric Physics and Dynamics.** A program that focuses on the scientific study of the processes governing the interactions, movement, and behavioral of atmospheric phenomena and related terrestrial and solar phenomena. Includes instruction in cloud and precipitation physics, solar radiation transfer, active and passive remote sensing, atmospheric electricity and acoustics, atmospheric wave phenomena, turbulence and boundary layers, solar wind, geomagnetic storms, coupling, natural plasma, and energization.
- 40.0404 Meteorology.** A program that focuses on the scientific study of the prediction of atmospheric motion and climate change. Includes instruction in general circulation patterns, weather phenomena, atmospheric predictability, parameterization, numerical and statistical analysis, large- and mesoscale phenomena, kinematic structures, precipitation processes, and forecasting techniques.
- 40.0499 Atmospheric Sciences and Meteorology, Other.** Any instructional program in atmospheric sciences and meteorology not listed above.
- 40.0501 Chemistry, General.** A general program that focuses on the scientific study of the composition and behavior of matter, including its micro- and macro-structure, the processes of chemical change, and the theoretical description and laboratory simulation of these phenomena.
- 40.0502 Analytical Chemistry.** A program that focuses on the scientific study of techniques for analyzing and describing matter, including its precise composition and the interrelationships of constituent elements and compounds. Includes instruction in spectroscopy, chromatography, atomic absorption, photometry, chemical modeling, mathematical analysis, laboratory analysis procedures and equipment maintenance, and applications to specific research, industrial and health problems.
- 40.0503 Inorganic Chemistry.** A program that focuses on the scientific study of the elements and their compounds, other than the hydrocarbons and their derivatives. Includes instruction in the characterization and synthesis of non-carbon molecules, including their structure and their bonding, conductivity, and reactive properties; research techniques such as spectroscopy, X-ray diffraction, and photoelectron analysis; and the study of specific compounds, such as transition metals, and compounds composed of inorganic and organic molecules.
- 40.0504 Organic Chemistry.** A program that focuses on the scientific study of the properties and behavior of hydrocarbon compounds and their derivatives. Includes instruction in molecular conversion and synthesis, the molecular structure of living cells and systems, the mutual reactivity of organic and inorganic compounds in combination, the spectroscopic analysis of hydrocarbon compounds, and applications to specific problems in research, industry, and health.
- 40.0506 Physical and Theoretical Chemistry.** A program that focuses on the scientific study of the theoretical properties of matter, and the relation of physical forces and phenomena to the chemical structure and behavior of molecules and other compounds. Includes instruction in reaction theory, calculation of potential molecular properties and behavior, computer simulation of structures and actions, transition theory, statistical mechanics, phase studies, quantum chemistry, and the study of surface properties.
- 40.0507 Polymer Chemistry.** A program that focuses on the scientific study of synthesized macromolecule and their interactions with other substances. Includes instruction in molecular bonding theory, polymerization, properties and behavior of unstable compounds, the development of tailored polymers, transition phenomena, and applications to specific industrial problems and technologies.
- 40.0508 Chemical Physics. (NEW)** A program that focuses on the scientific study of structural phenomena combining the disciplines of physical chemistry and atomic/molecular physics. Includes instruction in heterogeneous structures, alignment and surface phenomena, quantum theory, mathematical physics, statistical and classical mechanics, chemical kinetics, liquid crystals and membranes, molecular synthesis and design, and laser physics.
- 40.0509 Environmental Chemistry.** A program that focuses on the scientific study of natural systems (air, water, and soil) through the use of chemical techniques and instrumentation, with an emphasis on the movement and fate of pollutants and chemical aspects of contaminant remediation. Includes instruction in analytical, inorganic, organic, and physical chemistry; aquatic, soil, and atmospheric chemistry; environmental engineering; environmental toxicology; and analytical methods.
- 40.0510 Forensic Chemistry.** A program that focuses on the application of chemical techniques and instrumentation to the analysis and evaluation of physical evidence to aid in criminal investigations.

Includes instruction in analytical, inorganic, organic, and physical chemistry; biochemistry; forensic toxicology; instrumental analysis; crime scene processing; criminal investigation; forensic laboratory technology; and applicable law.

- 40.0511 Theoretical Chemistry.** A program that focuses on the study of mathematical and computational methods and fundamental laws of physics to describe chemical phenomena and to develop empirical models of molecules and their interactions. Includes instruction in properties of small, isolated molecules; dynamics of elementary chemical processes; reaction pathways of organic molecules; hydrogen bonding patterns in liquids; reaction rates of biological pathways; and advanced computational techniques.
- 40.0599 Chemistry, Other.** Any instructional program in chemistry not listed above.
- 40.0601 Geology/Earth Science, General.** A program that focuses on the scientific study of the earth; the forces acting upon it; and the behavior of the solids, liquids and gases comprising it. Includes instruction in historical geology, geomorphology, and sedimentology, the chemistry of rocks and soils, stratigraphy, mineralogy, petrology, geostatistics, volcanology, glaciology, geophysical principles, and applications to research and industrial problems.
- 40.0602 Geochemistry.** A program that focuses on the scientific study of the chemical properties and behavior of the silicates and other substances forming, and formed by geomorphological processes of the earth and other planets. Includes instruction in chemical thermodynamics, equilibrium in silicate systems, atomic bonding, isotopic fractionation, geochemical modeling, specimen analysis, and studies of specific organic and inorganic substances.
- 40.0603 Geophysics and Seismology.** A program that focuses on the scientific study of the physics of solids and its application to the study of the earth and other planets. Includes instruction in gravimetric, seismology, earthquake forecasting, magnetometry, electrical properties of solid bodies, plate tectonics, active deformation, thermodynamics, remote sensing, geodesy, and laboratory simulations of geological processes.
- 40.0604 Paleontology.** A program that focuses on the scientific study of extinct life forms and associated fossil remains, and the reconstruction and analysis of ancient life forms, ecosystems, and geologic processes. Includes instruction in sedimentation and fossilization processes, fossil chemistry, evolutionary biology, paleoecology, paleoclimatology, trace fossils, micropaleontology, invertebrate paleontology, vertebrate paleontology, paleobotany, field research methods, and laboratory research and conservation methods.
- 40.0605 Hydrology and Water Resources Science.** A program that focuses on the scientific study of the occurrence, circulation, distribution, chemical and physical properties, and environmental interaction of surface and subsurface waters, including groundwater. Includes instruction in geophysics, thermodynamics, fluid mechanics, chemical physics, geomorphology, mathematical modeling, hydrologic analysis, continental water processes, global water balance, and environmental science.
- 40.0606 Geochemistry and Petrology.** A program that focuses on the scientific study of the igneous, metamorphic, and hydrothermal processes within the earth and the mineral, fluid, rock, and ore deposits resulting from them. Includes instruction in mineralogy, crystallography, petrology, volcanology, economic geology, meteoritics, geochemical reactions, deposition, compound transformation, core studies, theoretical geochemistry, computer applications, and laboratory studies.
- 40.0607 Oceanography, Chemical and Physical.** A program that focuses on the scientific study of the chemical components, mechanisms, structure, and movement of ocean waters and their interaction with terrestrial and atmospheric phenomena. Includes instruction in material inputs and outputs, chemical and biochemical transformations in marine systems, equilibria studies, inorganic and organic ocean chemistry, oceanographic processes, sediment transport, zone processes, circulation, mixing, tidal movements, wave properties, and seawater properties.
- 40.0699 Geological and Earth Sciences/Geosciences, Other.** Any instructional program in geological and related sciences not listed above.
- 40.0801 Physics, General.** A general program that focuses on the scientific study of matter and energy, and the formulation and testing of the laws governing the behavior of the matter-energy continuum. Includes instruction in classical and modern physics, electricity and magnetism, thermodynamics, mechanics, wave properties, nuclear processes, relativity and quantum theory, quantitative methods, and laboratory methods.
- 40.0802 Atomic/Molecular Physics.** A program that focuses on the scientific study of the behavior of matter-energy phenomena at the level of atoms and molecules. Includes instruction in chemical physics, atomic forces and structure, fission reactions, molecular orbital theory, magnetic resonance, molecular bonding, phase equilibria, quantum theory of solids, and applications to the study of specific elements and higher compounds.
- 40.0804 Elementary Particle Physics.** A program that focuses on the scientific study of the basic constituents of sub-atomic matter and energy, and the forces governing fundamental processes. Includes instruction in quantum theory, field theory, single-particle systems, perturbation and scattering theory, matter-radiation interaction, symmetry, quarks, capture, Schrodinger mechanics, methods for detecting particle emission and absorption, and research equipment operation and maintenance.
- 40.0805 Plasma and High-Temperature Physics.** A program that focuses on the scientific study of properties and behavior of matter at high temperatures, such that molecular and atomic structures are in a disassociated ionic or electronic state. Includes instruction in magnetohydrodynamics, free electron phenomena, fusion theory, electromagnetic fields and dynamics, plasma and non-linear wave theory,

instability theory, plasma shock phenomena, quantitative modeling, and research equipment operation and maintenance.

- 40.0806 Nuclear Physics.** A program that focuses on the scientific study of the properties and behavior of atomic nuclei instruction in nuclear reaction theory, quantum mechanics, energy conservation, nuclear fission and fusion, strong and weak atomic forces, nuclear modeling, nuclear decay, nucleon scattering, pairing, photon and electron reactions, statistical methods, and research equipment operation and maintenance.
- 40.0807 Optics/Optical Sciences.** A program that focuses on the scientific study of light energy, including its structure, properties and behavior under different conditions. Includes instruction in wave theory, wave mechanics, electromagnetic theory, physical optics, geometric optics, quantum theory of light, photon detecting, laser theory, wall and beam properties, chaotic light, non-linear optics, harmonic generation, optical systems theory, and applications to engineering problems.
- 40.0808 Solid State and Low-Temperature Physics.** A program that focuses on the scientific study of solids and related states of matter at low energy levels, including liquids and dense gases. Includes instruction in statistical mechanics, quantum theory of solids, many-body theory, low temperature phenomena, electron theory of metals, band theory, crystalline structures, magnetism and superconductivity, equilibria and dynamics of liquids, film and surface phenomena, quantitative modeling, and research equipment operation and maintenance.
- 40.0809 Acoustics.** A program that focuses on the scientific study of sound, and the properties and behavior of acoustic wave phenomena under different conditions. Includes instruction in wave theory, the acoustic wave equation, energy transformation, vibration phenomena, sound reflection and transmission, scattering and surface wave phenomena, singularity expansion theory, ducting, and applications to specific research problems such as underwater acoustics, crystallography, and health diagnostics.
- 40.0810 Theoretical and Mathematical Physics.** A program that focuses on the scientific and mathematical formulation and evaluation of the physical laws governing, and models describing, matter-energy phenomena, and the analysis of related experimental designs and results. Includes instruction in classical and quantum theory, relativity theory, field theory, mathematics of infinite series, vector and coordinate analysis, wave and particle theory, advanced applied calculus and geometry, analyses of continuum, cosmology, and statistical theory and analysis.
- 40.0899 Physics, Other.** Any instructional program in physics not listed above.
- 40.1001 Materials Science.** A program that focuses on the general application of mathematical and scientific principles to the analysis and evaluation of the characteristics and behavior of solids, including internal structure, chemical properties, transport and energy flow properties, thermodynamics of solids, stress and failure factors, chemical transformation states and processes, compound materials, and research on industrial applications of specific materials.
- 40.1002 Materials Chemistry..** A program that focuses on the synthesis and study of organic or inorganic materials and their electronic, magnetic, optical or mechanical properties. Includes instruction in advanced materials for photonics, lasers, chemical sensors and arrays or nanochemistry; semiconductor nanowires; and molecular electronics.
- 40.1099 Materials Sciences, Other.** Any instructional program in materials sciences not listed above.
- 40.9999 Physical Sciences, Other.** Any instructional program in physical sciences not listed above.

#### Science Technologies 41.xxxx

- 41.0000 Science Technologies/Technicians, General.** A general program that prepares individuals to apply scientific principles and technical skills in support of scientific research and development. Includes instruction in standard laboratory practices and procedures; techniques for analysis, testing and inspection; laboratory instrumentation and equipment operation and maintenance; laboratory and materials handling safety; and computer applications.
- 41.0101 Biology Technician/Biotechnology Laboratory Technician.** A program that prepares individuals to apply scientific principles and technical skills in support of biologists and biotechnologists in research, industrial, and government settings. Includes instruction in fermentation technology, cell culturing, protein purification, biologic synthesis, assaying and testing, quality control, industrial microbiology, bioprocessing, chromatography and bioseparation, genetic technology, laboratory and hazardous materials safety, and computer applications.
- 41.0204 Industrial Radiologic Technology/Technician.** A program that prepares individuals to apply scientific principles and technical skills to the operation of industrial and research testing equipment using radioisotopes. Includes instruction in x-ray analysis of materials, nondestructive testing and inspection of materials, and continuous measurement of paper or metal thickness.
- 41.0205 Nuclear/Nuclear Power Technology/Technician.** A program that prepares individuals to apply scientific principles and technical skills in support of research scientists and operating engineers engaged in the running of nuclear reactors, and in nuclear materials processing and disposal. Includes instruction in basic nuclear physics and nuclear engineering, monitoring and safety procedures, radioactive materials handling and disposal, equipment maintenance and operation, and record keeping.
- 41.0299 Nuclear and Industrial Radiologic Technologies/Technicians, Other.** Any instructional program in nuclear and industrial radiologic technologies not listed above.
- 41.0301 Chemical Technology/Technician.** A program that prepares individuals to apply scientific principles and technical skills in support of chemical and biochemical research and industrial operations. Includes

- instruction in principles of chemistry and biochemistry, technical mathematics, computer applications, radiochemistry, industrial biochemistry, chemical instrumentation, physical chemistry, laboratory research methods, industrial processing methods and equipment, and test equipment operation and maintenance.
- 41.0303 Chemical Process Technology.** A program that prepares individuals to apply scientific principles and technical skills to the operation of chemical processing equipment in industries such as chemical manufacturing, petroleum refining, pharmaceutical manufacturing, and waste water treatment. Includes instruction in mathematics, chemistry, and physics; computer applications; chemical and refinery plant operations, processes, and equipment; safety, health, and environment; instrumentation; troubleshooting; and applications to specific industries.
- 41.0399 Physical Science Technologies/Technicians, Other.** Any instructional program in physical science technologies not listed above.
- 41.9999 Science Technologies/Technicians, Other.** Any instructional program in science technologies not listed above.

## Psychology 42.27xx

- 42.2701 Cognitive Psychology and Psycholinguistics.** A program that focuses on the scientific study of the mechanisms and processes of learning and thinking, and associated information encoding, decoding, processing and transmitting systems. Includes instruction in theories of cognition and intelligence; studies of cognitive processes such as memory, sensation, perception, pattern recognition, problem solving, and conceptual thinking; cybernetics; psycholinguistics; and the study of biological and social communications mechanisms and processes.
- 42.2702 Comparative Psychology.** A program that focuses on the behavior of members of particular species or groups and the relationship of the behaviors of the species or group to their evolutionary origins. Includes instruction in differential psychology, experimental and physiological psychology, psychopharmacology, psychology of individual differences, reinforcement theory, and neurophysiology.
- 42.2703 Developmental and Child Psychology.** A program that focuses on the scientific study of the psychological growth and development of individuals from infancy through adulthood. Includes instruction in cognitive and perceptual development, emotional development, personality development, the effects of biological maturation on behavior, theories of cognitive growth and related research methods, testing and assessment methods for different age levels, research on child and adolescent behavior therapy, and the psychology of aging.
- 42.2704 Experimental Psychology.** A program that focuses on the scientific study of behavior under experimental conditions and the analysis of controlled behavioral responses. Includes instruction in learning theory, research design and experimental methods, psychological measurement, statistical design and methods, analysis of cognitive and behavioral variables, and the conduct of specialized and large-scale studies.
- 42.2705 Personality Psychology.** A program that focuses on the unique organization of fairly permanent characteristics that set the individual apart from other individuals and, at the same time, determine how others respond to that individual. Includes instruction in Freudian, Skinnerian, Rogerian, and Ellisionian psychology; neo-Freudian psychology; psychological systems, neurophysiology, and psychopharmacology.
- 42.2706 Physiological Psychology/Psychobiology.** A program that focuses on the scientific course study of the biological bases of psychological functioning, and their application to experimental and therapeutic research problems. Includes instruction in functional neuroanatomy, neural system development, biochemical neural regulatory mechanisms, neurological biophysics, memory storage and retrieval, physiology of cognition and perception, physiological bases of psychopathology and behavioral disorders, psychopharmacology, comparative psychobiology, and specialized experimental design and research methods.
- 42.2707 Social Psychology.** A program that focuses on the scientific study of individual behavior in group contexts, group behavior, and associated phenomena. Includes instruction in social learning theory, group theory and dynamics, sex roles, social cognition and inference, attribution theory, attitude formation, criminal behavior and other social pathologies, altruistic behavior, social development, and social ecology.
- 42.2708 Psychometrics and Quantitative Psychology.** A program that focuses on the mathematical and statistical procedures used in psychological test construction and validation; the general problems of the measurement of behavior; and the application of quantitative methods to research design and other methodological topics.
- 42.2709 Psychopharmacology.** A program that focuses on the study of the behavioral effects of medications, drugs, nutrients, and chemicals (including natural and artificial toxins) in laboratory and clinical settings. Includes instruction in pharmacology, behavioral toxicology and pharmacology, neuroscience, physiology, clinical psychopharmacology, substance abuse treatments and antidotes, neurochemical mechanisms, epidemiology of chemicals and substances, biochemical interactions, and psychoactive drugs.
- 42.2799 Research and Experimental Psychology, Other.** Any instructional program in research and experimental psychology not listed above.

### **Forensic Science and Technology 43.0106**

**43.0106 Forensic Science and Technology.** A program that focuses on the application of the physical, biomedical, and social sciences to the analysis and evaluation of physical evidence, human testimony and criminal suspects. Includes instruction in forensic medicine, forensic dentistry, anthropology, psychology, entomology, pathology, forensic laboratory technology and autopsy procedures, DNA and blood pattern analysis, crime scene analysis, crime scene photography, fingerprint technology, document analysis, witness and suspect examination procedures, applicable law and regulations, and professional standards and ethics.

**43.0116 Cyber/Computer Forensics and Counterterrorism.** A program focusing on the principles and techniques used to identify, search, seize and analyze digital media and to conduct cyber investigations against criminal and terrorist activity. Includes instruction in computer boot processes and drives, jumper setting, file access and reconstruction, hacking, network systems, cryptography, programming, investigative techniques, forensic imagery, web-based investigation methods, cyberterrorism, and applicable laws and administrative procedures.

### **Geographic and Information Science and Cartography 45.xxxx**

**45.0301 Archeology.** A program that focuses on the systematic study of extinct societies, and the past of living societies, via the excavation, analysis and interpretation of their artifactual, human, and associated remains. Includes instruction in archeological theory, field methods, dating methods, conservation and museum studies, cultural and physical evolution, and the study of specific selected past cultures.

**45.0603 Econometrics and Quantitative Economics.** A program that focuses on the systematic study of mathematical and statistical analysis of economic phenomena and problems. Includes instruction in economic statistics, optimization theory, cost/benefit analysis, price theory, economic modeling, and economic forecasting and evaluation.

**45.0702 Geographic Information Science and Cartography.** A program that focuses on the systematic study of map-making and the application of mathematical, computer, and other techniques to the analysis of large amounts of geographic data and the science of mapping geographic information. Includes instruction in cartographic theory and map projections, computer-assisted cartography, geographic information systems, map design and layout, photogrammetry, air photo interpretation, remote sensing, spatial analysis, geodesy, cartographic editing, and applications to specific industrial, commercial, research, and governmental mapping problems.

### **Aeronautics/Aviation/Aerospace Science and Technology, General 49.0101**

**49.0101 Aeronautics/Aviation/Aerospace Science and Technology, General.** A program that focuses on the general study of aviation and the aviation industry, including in-flight and ground support operations. Includes instruction in the technical, business, and general aspects of air transportation systems.

### **Health Professions and Related Clinical Sciences 51.xxxx**

**51.1002 Cytotechnology/Cytotechnologist.** A program that prepares individuals to work with pathologists to detect changes in body cells that may indicate, and permit diagnosis of, the early development of cancers and other diseases. Includes instruction in biochemistry, microbiology, applied mathematics, microscopy, slide preparation, identification of cellular structures and abnormalities, and laboratory procedures and safety.

**51.1005 Clinical Laboratory Science/Medical Technology/Technologist.** A program that prepares individuals to conduct and supervise complex medical tests, clinical trials, and research experiments; manage clinical laboratories; and consult with physicians and clinical researchers on diagnoses, disease causation and spread, and research outcomes. Includes instruction in the theory and practice of hematology, clinical chemistry, microbiology, immunology, immunohematology, physiological relationships to test results, laboratory procedures and quality assurance controls, test and research design and implementation, analytic techniques, laboratory management, data development and reporting, medical informatics, and professional standards and regulations.

**51.1401 Medical Scientist (MS, PhD).** An undifferentiated clinical science program that prepares graduated physicians (MD or DO) as research scientists in various areas.

### **Pharmacy, Pharmaceutical Sciences, and Administration 52.20xx**

**51.2003 Pharmaceutics and Drug Design.** A program that focuses on the scientific study of the formulation of medicinal substances into product vehicles capable of being stored, transported, and then introduced into the patient and behaving in ways optimal to therapeutic interaction. Includes instruction in statistics, biopharmaceutics, drug metabolism, pharmacokinetics, pharmacodynamics, physical pharmacy, pharmacological analysis, drug design and development, pharmacological biotechnology, chemical separations, spectroscopy, drug-host interactions, immunology, quantitative drug measurement, enzymatic transformations, and metabolic excretion.

- 51.2004 Medicinal and Pharmaceutical Chemistry.** A program that focuses on the application of chemistry to the study of biologically and clinically active substances, biological and pharmacological interactions, and the development of associated research methods, techniques, and clinical trial procedures. Includes instruction in organic chemistry, biochemistry, molecular graphics, rational drug design, toxicology, molecular biology, pharmacology, enzyme mechanisms, receptor theory, neurochemistry, drug metabolism, drug synthesis, biological mechanisms of drug action, research tools and techniques, and laboratory safety.
- 51.2005 Natural Products Chemistry and Pharmacognosy** A program that focuses on the scientific study of biologically active compounds found in naturally occurring sources such as plants, animals, and microbes and their use and/or modification as medicinal substances. Includes instruction in medicinal chemistry, organic medicinals, pharmacological therapeutics, pharmacokinetics, molecular biology, structural chemistry, enzymes, nucleic acids, economic botany, ethnobotany, bioprospecting, bioassay, compound identification and isolation, mass spectrometry, and analytical instrumentation and techniques.
- 51.2006 Clinical and Industrial Drug Development.** A program that focuses on the scientific application of pharmacology, pharmaceuticals, and industrial management to the development, production, marketing, and distribution of pharmaceutical products. Includes instruction in industrial microbiology, plasmids, expression vectors, protein chemistry, assay and evaluation, drug synthesis and purification, quality control, industrial management, production security, patent procedures, intellectual property regulations and issues, patent enforcement and defense, and research design and testing.
- 51.2007 Pharmacoeconomics/Pharmaceutical Economics.** A program that focuses on the application of economics and policy analysis to the study of the relationship of pharmacy services and pharmaceutical processes and products to the health care system and their impact on health care organizations. Includes instruction in health economics, pharmacoeconomics, health care systems, health care organization and management, statistics and biostatistics, outcomes research, health care policy, pharmacy services, and pharmaceutical industry operations.
- 51.2009 Industrial and Physical Pharmacy and Cosmetic Sciences.** A program that focuses on the application of pharmaceutical sciences and pharmacy to the study of pharmaceuticals production and distribution, and prepares individuals to manage pharmaceutical industry operations. Includes instruction in pharmacoeconomics, industrial management, operations management, preformulation evaluation, product formulation/reformulation, drug product development, stability testing, dosage design, pilot scale-up, drug marketing, quality control, drug information, and legal and regulatory affairs.
- 51.2010 Pharmaceutical Sciences.** A program that focuses on the basic sciences that underlie drugs and drug therapy and that prepares individuals for further study and/or careers in pharmaceutical science and research, pharmaceutical administration and sales, biotechnology, drug manufacturing, regulatory affairs, and related fields. Includes instruction in mathematics, biology, chemistry, physics, statistics, pharmaceuticals, pharmacology and toxicology, dosage formulation, manufacturing, quality assurance, and regulations.
- 51.2202 Environmental Health.** A program that focuses on the application of environmental sciences, public health, the biomedical sciences, and environmental toxicology to the study of environmental factors affecting human health, safety, and related ecological issues, and prepares individuals to function as professional environmental health specialists. Includes instruction in epidemiology, biostatistics, toxicology, public policy analysis, public management, risk assessment, communications, environmental law, occupational health and safety emergency response, and applications such as air quality, food protection, radiation protection, solid and hazardous waste management, water quality, soil quality, noise abatement, housing quality, and environmental control of recreational areas.
- 51.2205 Health/Medical Physics.** A program that focuses on the application of physics, nuclear science, and engineering physics to diagnostic, treatment, and therapeutic processes and public health protection. Includes instruction in radiation biophysics, biophysics, health effects of natural and artificially induced radiation, hazard evaluation, environmental radioactivity, nuclear physics, engineering physics, radiobiology, medical radiology, calibration and dosage theory, computer applications and medical informatics, and specific research problems.
- 51.2502 Veterinary Anatomy.** A program that focuses on the scientific study of the structure of small and large animal cellular, organ, tissue, and body systems and their relation to physiologic function, disease, and therapeutic treatment. Includes instruction in histology, ultrastructure, molecular biology, biochemistry, developmental biology, neuroscience, electrophysiology, electron microscopy, computer imaging, and applications to specific species.
- 51.2503 Veterinary Physiology.** A program that focuses on the scientific study of the functional dynamics of animal biological systems and their relationship to the diagnosis and treatment of disease and injury. Includes instruction in mammalian and non-mammalian physiology, laboratory physiology, physiological responses to the environment, endocrinology, animal biotechnology, mechanisms of hormone action, organ systems, metabolism, and pathophysiology.
- 51.2504 Veterinary Microbiology and Immunobiology.** A program that focuses on the scientific study of the microbial causation and immunologic processes related to animal disease, prevention, and treatment. Includes instruction in bacteriology, mycology, virology, immune response mechanisms, humoral and cell

function, cancer defenses, immune system dysfunction, immunologic diseases, parasitology, pathogenesis, and disease vectors.

- 51.2505 Veterinary Pathology and Pathobiology.** A program that focuses on the scientific study of the development and process of disease in domestic and wild animals and applications to diagnosis, prevention, and treatment. Includes instruction in pathogenesis, immunoparasitology, viral therapy, inherited metabolic diseases, environmental toxicology, anatomical and clinical pathology, necropsy and biopsy techniques, clinical laboratory analysis, pathological interpretation, and disease diagnosis.
- 51.2506 Veterinary Toxicology and Pharmacology.** A program that focuses on the scientific study of specific environmental and food hazards affecting domestic and wild animals and the development and action of chemical antidotes and treatments. Includes instruction in small and large animal toxicology and pharmacology, neurotoxicology, pharmacodynamics, pharmacokinetics, neuropharmacology, xenobiotics, drug resistance, pesticides, toxicological pathology, genetic and molecular toxicology, environmental toxicology, drug and toxicant analysis and evaluation, and environmental radiology.
- 51.2510 Veterinary Preventive Medicine Epidemiology and Public Health.** A program that focuses on the study of the prevention and control of communicable animal diseases, diseases affecting humans, and prepares veterinarians to function as public health specialists. Includes instruction in animal epidemiology, biostatistics, food safety and quality assurance, food toxicology, zoonotic and infectious diseases, disease vectors and transference, production medicine, animal health, veterinary public health practice, and inspection and evaluation methods.
- 51.2511 Veterinary Infectious Diseases.** A program that focuses on the scientific study of zoonotic infectious diseases, disease mechanisms, and prevention and treatment strategies. Includes instruction in disease pathogenesis, vector biology, mycobacterial infection, blood parasites, retroviruses, food-borne diseases, new infectious agents, ecotoxicology, mechanisms of disease transfer, antibody resistance, comparative pathology, communicable diseases, and disease prevention and eradication.

#### **Medical Informatics 52.2706**

- 51.2706 Medical Informatics.** A program that focuses on the application of computer science and software engineering to medical research and clinical information technology support, and the development of advanced imaging, database, and decision systems. Includes instruction in computer science, health information systems architecture, medical knowledge structures, medical language and image processing, quantitative medical decision modeling, imaging techniques, electronic medical records, medical research systems, clinical decision support, and informatics aspects of specific research and practice problems

#### **Management Sciences and Quantitative Methods 52.13xx**

- 52.1301 Management Science.** A general program that focuses on the application of statistical modeling, data warehousing, data mining, programming, forecasting and operations research techniques to the analysis of problems of business organization and performance. Includes instruction in optimization theory and mathematical techniques, data mining, data warehousing, stochastic and dynamic modeling, operations analysis, and the design and testing of prototype systems and evaluation models.
- 52.1302 Business Statistics.** A program that focuses on the application of mathematical statistics to the description, analysis, and forecasting of business data. Includes instruction in statistical theory and methods, computer applications, data analysis and display, long- and short-term forecasting methods, and market performance analysis.
- 52.1304 Actuarial Science.** A program that focuses on the mathematical and statistical analysis of risk, and their applications to insurance and other business management problems. Includes instruction in forecasting theory, quantitative and non-quantitative risk measurement methodologies, development of risk tables, secondary data analysis, and computer-assisted research methods.
- 52.1399 Management Science and Quantitative Methods, Other.** Any instructional program in business quantitative methods and management science not listed above.