

**11. COMPUTER AND INFORMATION SCIENCES AND SUPPORT SERVICES.** Instructional programs that focus on the computer and information sciences and prepare individuals for various occupations in information technology and computer operations fields.

**11.01 Computer and Information Sciences, General .** Instructional content is defined in code 11.0101.

**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. (NEW)** 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.

---- **Robotics Technology/Technician.** (Report under 15.0405)

---- **Computer Hardware Engineering.** (Report under 14.0902)

---- **Computer Hardware Technology/Technician.** (Report under 15.1203)

**11.0103 Information Technology. (NEW)** 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.

---- **Bioinformatics.** (Report under 26.1103)

----- **Medical Informatics.** (Report under 51.2706)

**11.02 Computer Programming.** Instructional content for this group programs is defined in codes 11.0201- 11.0299.

**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.

----- **Computer Installation and Repair Technology.** (Report under 47.0104)

**11.0202 Computer Programming, Specific Applications. (NEW)** 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.

----- **Medical Office Computer Specialist/Assistant.** (Report under 51.0709)

**11.0203 Computer Programming, Vendor/Product Certification. (NEW)** 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.

**11.03 Data Processing.** Instructional content is defined in code 11.0301.

**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.

**11.04 Information Science/Studies.** Instructional content is defined in code 11.0401.

**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.

----- **Library Science/Librarianship.** (Report under 25.0101)

----- **Systems Science and Theory.** (Report under 30.0601)

----- **Cognitive Science.** (Report under 30.2501)

**11.05 Computer Systems Analysis.** Instructional content is defined in code 11.0501.

**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.

----- **Systems Engineering.** (Report under 14.2701)

----- **Systems Science and Theory.** (Report under 30.0601)

----- **Bioinformatics.** (Report under 26.1103)

----- **Medical Informatics.** (Report under 51.2706)

**11.07 Computer Science.** Instructional content is defined in code 11.0701.

**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.

----- **Computational Mathematics.** (Report under 27.0303)

----- **Computer Engineering, General.** (Report under 14.0901)

----- **Computer Engineering Technology/Technician.** (Report under 15.1201)

**11.08 Computer Software and Media Applications. (NEW)** Instructional content for this group of programs is defined in codes 11.0801- 11.0899.

----- **Computer Software Engineering.** (Report under 14.0903)

----- **Computer Software Technology/Technician.** (Report under 15.1204)

**11.0801 Web Page, Digital/Multimedia and Information Resources Design. (NEW)** 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.

----- **Publishing.** (Report under 09.1001)

----- **Prepress/Desktop Publishing and Digital Imaging Design.** (Report under 10.0303)

----- **Animation, Interactive Technology, Video Graphics, and Special Effects.** (Report under 10.0304)

**11.0802 Data Modeling/Warehousing and Database Administration. (NEW)** 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. (NEW)** 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.

-----      **Animation, Interactive Technology, Video Graphics, and Special Effects.** (Report under 10.0304)

**11.09**      **Computer Systems Networking and Telecommunications. (NEW)** Instructional content is defined in code 11.0901.

**11.0901**      **Computer Systems Networking and Telecommunications. (NEW)** 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.

**11.10**      **Computer/Information Technology Administration and Management. (NEW)** Instructional content for this group of programs is defined in codes 11.1001-11.1099.

-----      **Customer Service Management.** (Report under 52.0207)

-----      **Management Information Systems , General.** (Report under 52.1201)

-----      **Information Resources Management/CIO Training.** (Report under 52.1206)

**11.1001**      **System Administration/Administrator. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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.

**14. ENGINEERING.** Instructional programs that prepare individuals to apply mathematical and scientific principles to the solution of practical problems.

**14.01 Engineering, General.** Instructional content is defined in code 14.0101.

----- **MATHEMATICS.** (Report under 27. Series)

----- **PHYSICAL SCIENCES.** (Report under 40. Series)

**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.

----- **Engineering Technology, General.** (Report under 15.0000)

**14.02 Aerospace, Aeronautical and Astronautical Engineering.** Instructional content is defined in code 14.0201.

**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.

----- **Aeronautical/Aerospace Engineering Technology/Technician.** (Report under 15.0801)

**14.03 Agricultural/Biological Engineering and Bioengineering.** Instructional content is defined in code 14.0301.

**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.

----- **Food Science and Technology.** (Report under 01.10 Series)

**14.04 Architectural Engineering.** Instructional content is defined in code 14.0401.

**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.

----- **Architecture.** (Report under 04.02 Series)

----- **Architectural Engineering Technology/Technician.** (Report under 15.0101)

- 14.05 Biomedical/Medical Engineering.** Instructional content is defined in code 14.0501.
- 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.
- **Biomedical Technology/Technician.** (Report under 15.0401)
- **Environmental Control Technologies/Technicians.** (Report under 15.05 Series)
- **Occupational Safety and Health Technology/Technician.** (Report under 15.0701)
- **Biotechnology.** (Report under 26.1201)
- **Biology Technician/Biotechnology Laboratory Technician.** (Report under 41.0101 Series)
- **HEALTH PROFESSIONS AND RELATED CLINICAL SCIENCES.** (Report under 51.Series)
- 14.06 Ceramic Sciences and Engineering.** Instructional content is defined in code 14.0601.
- 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.
- 14.07 Chemical Engineering.** Instructional content is defined in code 14.0701.
- 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.
- **Chemistry.** (Report under 40.05 Series)
- **Chemical Technology/Technician.** (Report under 41.0301)
- 14.08 Civil Engineering.** Instructional content for this group of programs is defined in codes 14.0801-14.0899.
- 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.

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**Civil Engineering/Civil Technology/Technician.** (Report under 15.0201)

**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.

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**Construction Engineering Technology/Technician.** (Report under 15.1001)

**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.

**14.09 Computer Engineering, General.** Instructional content for this group of programs is defined in codes 14.0901- 14.0999.

**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.

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**Computer Science.** (Report under 11.0701 Series)

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**Computer Engineering Technology/Technician.** (Report under 15.1201)

----- **Computer Technology/Computer Systems Technology.** (Report under 15.1202)

**14.0902** **Computer Hardware Engineering. (NEW)** 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. (NEW)** 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.

**14.10** **Electrical, Electronics and Communications Engineering.** Instructional content is defined in code 14.1001

**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.

----- **Electrical, Electronic and Communications Engineering Technology/Technician.** (Report under 15.0303)

**14.11** **Engineering Mechanics.** Instructional content is defined in code 14.1101.

**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.

**14.12** **Engineering Physics.** Instructional content is defined in code 14.1201.

**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.

- 14.13 Engineering Science.** Instructional content is defined in code 14.1301.
- 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.
- 14.14 Environmental/Environmental Health Engineering.** Instructional content is defined in code 14.1401.
- 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.
- **Environmental Control Technologies.** (Report under 15.05 Series)
- **Environmental Studies.** (Report under 03.0103)
- **Environmental Science.** (Report under 03.0104)
- **Quality Control and Safety Technologies.** (Report under 15.07 Series)
- [14.15] Geological Engineering.** (Deleted)
- [14.1501] Geological Engineering.** (Deleted, Report under code 14.3901)
- [14.16] Geophysical Engineering.** (Deleted)
- [14.1601] Geophysical Engineering.** (Deleted Report under code 14.3901)
- [14.17] Industrial/Manufacturing Engineering.** (Deleted)
- [14.1701] Industrial/Manufacturing Engineering.** (Deleted, Report under code 14.3501 or 14.3601).
- 14.18 Materials Engineering** Instructional content is defined in code 14.1801.
- 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.

----- **Materials Science.** (Report under 14.3101)

**14.19 Mechanical Engineering.** Instructional content is defined in code 14.1901.

**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.

**14.20 Metallurgical Engineering.** Instructional content is defined in code 14.2001.

**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.

----- **Metallurgical Technology/Technician.** (Report under 15.0611)

**14.21 Mining and Mineral Engineering.** Instructional content is defined in code 14.2101.

**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.

----- **Mining Technology/Technician.** (Report under 15.0901)

**14.22 Naval Architecture and Marine Engineering.** Instructional content is defined in code 14.2201.

**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.

**14.23 Nuclear Engineering.** Instructional content is defined in code 14.2301.

**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.

----- **Nuclear Physics.** (Report under 40.0806)

----- **Nuclear/Nuclear Power Technology/Technician.** (Report under 41.0205)

**14.24 Ocean Engineering.** Instructional content is defined in code 14.2401

**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.

----- **Oceanography.** (Report under 40.0607)

**14.25 Petroleum Engineering.** Instructional content is defined in code 14.2501.

**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.

----- **Petroleum Technology/Technician.** (Report under 15.0903)

**14.27 Systems Engineering.** Instructional content is defined in code 14.2701.

**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.

----- **Computer Science.** (Report under 11.0701 Series)

----- **Systems Science and Theory.** (Report under 30.0601)

**14.28 Textile Sciences and Engineering.** Instructional content is defined in code 14.2801.

**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.

[14.29] **Engineering Design.** (Deleted)

[14.2901] **Engineering Design.** (Deleted, Report under 14.9999)

[14.30] **Engineering/Industrial Management.** (Deleted)

(14.3001) **Engineering/Industrial Management.** (Moved, Report under 15.1501)

**14.31 Materials Science.** Instructional content is defined in code 14.3101.

**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.

----- **Materials Engineering.** (Report under 14.1801)

**14.32 Polymer/Plastics Engineering.** Instructional content is defined in code 14.3201.

**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.

----- **Plastics Engineering Technology/Technician.** (Report under 15.0607)

----- **Polymer Chemistry.** (Report under 40.0507)

**14.33 Construction Engineering. (NEW)** Instructional content is defined in code 14.3301.

- 14.3301**      **Construction Engineering. (NEW)** 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.
- 14.34**      **Forest Engineering. (NEW)** Instructional content is defined in code 14.3401.
- 14.3401**      **Forest Engineering. (NEW)** 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.
- 14.35**      **Industrial Engineering. (NEW)** Instructional content is defined in code 14.3501.
- 14.3501**      **Industrial Engineering. (NEW)** 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.
- **Industrial Technology/Technician.** (Report under 15.0612)
- 14.36**      **Manufacturing Engineering. (NEW)** Instructional content is defined in code 14.3601.
- 14.3601**      **Manufacturing Engineering. (NEW)** 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.
- 14.37**      **Operations Research. (NEW)** Instructional content is defined in code 14.3701.
- 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. (*Moved from 27.0302*)
- 14.38**      **Surveying Engineering. (NEW)** Instructional content is defined in code 14.3801.

**14.3801**      **Surveying Engineering. (NEW)** 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.

**14.39**      **Geological/Geophysical Engineering. (NEW)** Instructional content is defined in code 14.3901.

**14.3901**      **Geological/Geophysical Engineering. (NEW)** 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.

-----      **Geology/Earth Science.** (Report under 40.0601)

-----      **Geophysics and Seismology.** (Report under 40.0603)

**15. ENGINEERING TECHNOLOGIES/TECHNICIANS.** Instructional programs that prepare individuals to apply basic engineering principles and technical skills in support of engineering and related projects.

-----      **ENGINEERING.** (Report under 14. Series)

**15.00**      **Engineering Technology, General. (NEW)** Instructional content is defined in code 15.0000.

**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. (*Moved from 15.1101*)

**15.01 Architectural Engineering Technologies/Technicians.** Instructional content is defined in code 15.0101.

**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.

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**Architectural Engineering.** (Report under 14.0401)

**15.02 Civil Engineering Technologies/Technicians.** Instructional content is defined in code 15.0201.

**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.

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**Civil Engineering.** (Report under 14.08 Series)

**15.03 Electrical Engineering Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0303 - 15.0399.

**(15.0301) Computer Engineering Technology/Technician.** (Moved, Report under 15.1201).

**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.

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**Electrical, Electronics and Communications Engineering.** (Report under 14.1001)

**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. (NEW)** 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.

**15.04 Electromechanical Instrumentation and Maintenance Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0401- 15.0499.

- 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.
- [15.0402] Computer Maintenance Technology/Technician.** (Deleted, Report under 15.1202)
- 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. *(Moved from 47.0401)*
- 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.

**15.05 Environmental Control Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0501- 15.0599.

- 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.
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- Heating, Air Conditioning and Refrigeration Maintenance Technology/Technician.** (Report under 47.0201)
- 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. (NEW)** 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.

**15.06 Industrial Production Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0607- 15.0699.

**[15.0603] Industrial/Manufacturing Technology/Technician.** (Deleted, Report under code 15.0612 or 15.0613)

**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. (NEW)** 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. (NEW)** 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.

**15.07 Quality Control and Safety Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0701- 15.0799.

**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. (NEW)** 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. (NEW)** 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.

**15.08**      **Mechanical Engineering Related Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0801- 15.0899.

**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.

-----      **Avionics Maintenance Technology/Technician.** (Report under 47.0609)

**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.

----- **Automobile/Automotive Mechanics Technology/Technician.** (Report under 47.0604)

**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.

**15.09 Mining and Petroleum Technologies/Technicians.** Instructional content for this group of programs is defined in codes 15.0901- 15.0999.

**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.

- 15.10 Construction Engineering Technologies.** Instructional content is defined in code 15.1001.
- 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.
- **Architectural Engineering Technology.** (Report under 15.0101)
- **Building/Home Construction Inspection/Inspector.** (Report under 46.0403)
- 15.11 Engineering-Related Technologies.** Instructional content is defined in codes 15.1102 – 15.1199.
- (15.1101) Engineering Technology/Technician, General.** (Moved, Report under 15.0000)
- 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.
- 15.12 Computer Engineering Technologies/Technicians. (NEW)** Instructional content for this group of programs is defined in codes 15.1201- 15.1299.
- 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.  
(Moved from 15.0301)

**15.1202**      **Computer Technology/Computer Systems Technology. (NEW)**  
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.

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**Computer Installation and Repair Technology/Technician.**  
(Report under 47.0104)

**15.1203**      **Computer Hardware Technology/Technician. (NEW)** 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. (NEW)** 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.

**15.13**      **Drafting/Design Engineering Technologies/Technicians. (NEW)** Instructional content for this group of programs is defined in codes 15.1301- 15.1399.

**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. (Moved from 48.0101)

**15.1302**      **CAD/CADD Drafting and/or Design Technology/Technician. (NEW)**  
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.  
(Moved from 48.0102)

- 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. (Moved from 48.0103)
- 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. (Moved from 48.0104)
- 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. (Moved from 48.0105)

**15.14**      **Nuclear Engineering Technologies/Technicians. (NEW)** Instructional content is defined in code 15.1401.

- 15.1401**      **Nuclear Engineering Technology/Technician. (NEW)** 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.

**15.15**      **Engineering-Related Fields. (NEW)** Instructional content is defined in code 15.1501.

- 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.  
*(Moved from 14.3001)*

----- **Business Administration and Management.** (Report under 52.0201)

**26. BIOLOGICAL AND BIOMEDICAL SCIENCES.** Instructional programs that focus on the biological sciences and the non-clinical biomedical sciences, and that prepare individuals for research and professional careers as biologists and biomedical scientists.

----- **AGRICULTURE, AGRICULTURAL OPERATIONS AND RELATED SCIENCES.** (Report under 01. Series)

----- **NATURAL RESOURCES AND CONSERVATION.** (Report under 03. Series)

----- **MULTI- AND INTERDISCIPLINARY STUDIES.** (Report under 30. Series)

----- **HEALTH PROFESSIONS AND RELATED CLINICAL SCIENCES.** (Report under 51. Series)

**26.01 Biology, General.** Instructional content for this group of programs is defined in codes 26.0101 - 26.0102.

**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. (NEW)** 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.

**26.02 Biochemistry, Biophysics and Molecular Biology.** Instructional content for this group of programs is defined in codes 26.0202- 26.0299.

- 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.  
*(Moved from 26.0402)*
- 26.0205 Molecular Biochemistry. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (*Moved from 26.0611*)

**26.0210**      **Biochemistry/Biophysics and Molecular Biology. (NEW)** 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.

**26.03**      **Botany/Plant Biology.** Instructional content for this group of programs is defined in codes 26.0301- 26.0399.

-----      **Plant Sciences.** (Report under 01.11 Series)

**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 systemics; and ecology.

**26.0308**      **Plant Molecular Biology. (NEW)** 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.

**26.04 Cell/Cellular Biology and Anatomical Sciences.** Instructional content for this group of programs is defined in codes 26.0401- 26.0499.

**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.

**(26.0402) Molecular Biology.** (Moved, Report under 26.0204)

**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. (*Moved from 26.0601*)

**26.0404 Developmental Biology and Embryology. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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.

**26.05 Microbiological Sciences and Immunology.** Instructional content for this group of programs is defined in codes 16.0502- 16.0599.

**[26.0501] Microbiology/Bacteriology.** (Deleted, Report under 26.0503)

**26.0502 Microbiology, General. (NEW)** 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.

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**Soil Microbiology.** (Report under 01.1203)

**26.0503 Medical Microbiology and Bacteriology. (NEW)** 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 parasitological 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. (*Moved from 26.0619*)

**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. (*Moved from 26.0610*)

**26.0506 Mycology. (NEW)** 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. (*Moved from 26.0618*)

**[26.06] Miscellaneous Biological Specializations.** (Deleted).

**(26.0601) Anatomy.** (Moved, Report under 26.0403)

**(26.0603) Ecology.** (Moved, Report under 26.1301)

**(26.0607) Marine/Aquatic Biology** (Moved, Report under 26.1302).

**(26.0608) Neuroscience.** (Moved, Report under 30.2401)

**(26.0609) Nutrition Sciences.** (Moved, Report under 30.1901)

**(26.0610) Parasitology.** (Moved, Report under 26.0505)

**(26.0611) Radiation Biology/Radiobiology.** (Moved, Report under 26.0209)

**(26.0612) Toxicology.** (Moved, Report under 26.1004)

**[26.0613] Genetics, Plant and Animal.** (Deleted, Report under code 26.0804 or 26.0805)

**(26.0614) Biometrics.** (Moved, Report under 26.1101)

**(26.0615) Biostatistics.** (Moved, Report under 26.1102)

**(26.0616) Biotechnology.** (Moved, Report under 26.1201)

**(26.0617) Evolutionary Biology.** (Moved, Report under 26.1303)

**(26.0618) Biological Immunology.** (Moved, Report under 26.0507)

**(26.0619) Virology.** (Moved, Report under 26.0504)

**26.07 Zoology/Animal Biology.** Instructional content for this group of programs is defined in codes 26.0701– 26.0799.

**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.

**[26.0704] Pathology, Human and Animal.** (Deleted, Report under 26.0910)

**(26.0705) Pharmacology.** (Moved, Report under 26.1001)

**[26.0706] Physiology, Human and Animal.** (Deleted, Report under 26.0707 or 26.0901)

**26.0707 Animal Physiology. (NEW)** 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.

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**Physiology, Pathology and Related Sciences.** (Report under 26.09 Series)

**26.0708 Animal Behavior and Ethology. (NEW)** 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. (NEW)** 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.

**26.08 Genetics. (NEW)** Instructional content for this group of programs is defined in codes 26.0801- 26.0899.

- 26.0801**      **Genetics, General. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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.
- **Agricultural Animal Breeding.** (Report under 01.0902)
- **Human /Medical Genetics.** (Report under 26.0806)
- 26.0805**      **Plant Genetics. (NEW)** 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.
- **Agricultural and Horticultural Plant Breeding.** (Report under 01.1104)
- 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.  
(Moved from 51.1306)

----- **Genetic Counseling/Counselor.** (Report under 51.1509)

----- **Gene/Genetic Therapy.** (Report under 51.0914)

**26.09 Physiology, Pathology and Related Sciences. (NEW)** Instructional content for this group of programs is defined in codes 26.0901- 26.0999.

**26.0901 Physiology, General. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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.

----- **Neuroscience.** (Report under 30.2401)

----- **Biopsychology.** (Report under 30.1001)

**26.0907** **Cardiovascular Science. (NEW)** 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. (NEW)** 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.

----- **Kinesiology and Exercise Science.** (Report under 31.0505)

**26.0909** **Vision Science/Physiological Optics. (NEW)** 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. (NEW)** 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. (NEW)** 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.

**26.10**      **Pharmacology and Toxicology. (NEW)** Instructional content for this group of programs is defined in codes 26.1001- 26.1099.

**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)

-----      **Veterinary Toxicology and Pharmacology.** (Report under 51.2506)

**26.1002**      **Molecular Pharmacology. (NEW)** 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. (NEW)** 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. (NEW)*** 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. (NEW)*** 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. (NEW)*** 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.

**26.11**      ***Biomathematics and Bioinformatics. (NEW)*** Instructional content for this group of programs is defined in codes 26.1101- 26.1199.

**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.  
(*Moved from 26.0614*)

**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. (Moved from 26.0615)

**26.1103      *Bioinformatics. (NEW)*** 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.

----- **Medical Informatics.** (Report under 51.2706)

**26.12      *Biotechnology. (NEW)*** Instructional content is defined in 26.1201.

**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)

**26.13      *Ecology, Evolution, Systematics, and Population Biology. (NEW)*** Instructional content for this group of programs is defined in codes 26.1301 – 26.1399.

**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. (Moved from 26.0603)

**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 paleocology and paleontology; and applications to fields such as fisheries science and biotechnology.  
(Moved from 26.0607)

- 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. (Moved from 26.0617)
- 26.1304**      **Aquatic Biology/Limnology. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (*Moved from 51.2203*)

**27.      MATHEMATICS AND STATISTICS.** Instructional programs that focus on the systematic study of logical symbolic language and its applications.

**27.01      Mathematics.** Instructional content for this group of programs is defined in codes 27.0101 - 27.0199.

**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. (NEW)** 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. (NEW)** 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. (NEW)** 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. (NEW)** 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.

**27.03**      **Applied Mathematics.** Instructional content for this group of programs is defined in codes 27.0301- 27.0399.

**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.

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**Econometrics/Quantitative Economics.** (Report under 45.0603)

**(27.0302)**      **Operations Research.** (Moved, Report under 14.3701)

**27.0303**      **Computational Mathematics. (NEW)** 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.

**27.05**      **Statistics.** Instructional content for this group of programs is defined in codes 27.0501- 27.0599.

**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.

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**Educational Statistics and Research Methods.** (Report under 13.0603)

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**Biometry/Biometrics.** (Report under 26.1101)

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**Biostatistics.** (Report under 26.1102)

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**Psychometrics and Quantitative Psychology.** (Report under 42.1901)

----- **Demography/Population Studies.** (Report under 45.0501)

----- **Actuarial Science.** (Report under 52.1304)

**27.0502** **Mathematical Statistics and Probability. (NEW)** 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.

**29. MILITARY TECHNOLOGIES.** Instructional programs that prepare individuals in specialized and advanced subject matter for the armed services and related national security organizations.

**29.01 Military Technologies.** Instructional content is defined in code 29.0101.

**29.0101 Military Technologies.** A program that prepares individuals to undertake advanced and specialized leadership and technical responsibilities for the armed services and related national security organizations. Includes instruction in such areas as weapons systems and technology, communications, intelligence, management, logistics, and strategy.

**40. PHYSICAL SCIENCES.** Instructional programs that focus on the scientific study of inanimate objects, processes of matter and energy, and associated phenomena.

**40.01 Physical Sciences.** Instructional content is defined in code 40.0101.

**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.

**40.02 Astronomy and Astrophysics.** Instructional content for this group of programs is defined in codes 40.0201- 40.0299.

**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. (*Moved from 40.0301*)

**40.0203 Planetary Astronomy and Science. (NEW)** 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.

**[40.03] Astrophysics.** (Deleted)

**(40.0301) Astrophysics.** (Moved, Report under 40.0202)

**40.04 Atmospheric Sciences and Meteorology.** Instructional content for this group of programs is defined in codes 40.0401- 40.0499.

**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. (NEW)** 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. (NEW)** 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. (NEW)** 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.

**40.05**      **Chemistry.** Instructional content for this group of programs is defined in codes 40.0501-40.0599.

**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.

-----      **Chemistry Teacher Education.** (Report under 13.1323)

-----      **Chemical Engineering.** (Report under 14.0701)

**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.

**(40.0505) Medicinal/Pharmaceutical Chemistry.** (Moved, Report under 51.2004)

**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.

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**Polymer/Plastics Engineering.** (Report under 14.3201)

**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.

**40.06 Geological and Earth Sciences/Geosciences.** Instructional content for this group of programs is defined in codes 40.0601 - 40.0699.

**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.

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**Geological/Geophysical Engineering.** (Report under 14.3901)

**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. (NEW)** 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. (NEW)** 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.  
(Moved from 40.0702)

-----      **Marine Biology and Biological Oceanography.** (Report under 26.1302)

**[40.07] Miscellaneous Physical Sciences.** (Deleted)

**[40.0701]**      **Metallurgy.** (Deleted, Report under 40.9999)

**(40.0702)**      **Oceanography, Chemical and Physical.** (Moved, Report under 40.0607)

**[40.0703]**      **Earth and Planetary Sciences.** (Deleted, Report under 40.0601)

**40.08 Physics.** Instructional content for this group of programs is defined in codes 40.0801-40.0899.

**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.

----- **Physics Teacher Education.** (Report under 13.1329)

----- **Engineering Physics.** (Report under 14.1201)

----- **Biophysics.** (Report under 26.0203)

----- **Molecular Biophysics.** (Report under 26.0206)

**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.

----- **Nuclear Engineering.** (Report under 14.2301)

**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.

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**Vision Sciences and Physiological Optics.** (Report under 26.0909)

**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.

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**Mathematics.** (Report under 27. Series)

**41. SCIENCE TECHNOLOGIES/TECHNICIANS.** Instructional programs that prepare individuals to apply scientific principles and technical skills in support of scientific research and development.

**41.01 Biology Technician/Biotechnology Laboratory Technician.** Instructional content is defined in code 41.0101.

**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.

----- **Health and Medical Laboratory Technologies/Technicians.** (Report under 51.10 Series)

**41.02 Nuclear and Industrial Radiologic Technologies/Technicians.** Instructional content for this group of programs is defined in codes 41.0204 – 41.0299.

**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.

**41.03 Physical Science Technologies/Technicians.** Instructional content for this group of programs is defined in codes 41.0301 – 41.0399.

**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.

**51.14 Medical Clinical Sciences/Graduate Medical Studies.** Instructional content is defined in code 51.1401. **Note** ➔ *Program completions in specific biomedical science fields should be reported under Series 26. Medical education residencies should be reported under Series 60.02 in chapter II.*

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

**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. *(Moved from 52.0802)*