

# Institute of Technology Course Descriptions

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## ACCOUNTING

### **ACCT 201. Principles of Accounting. 3 Hours.**

The concepts, principles, and procedures pertaining to the preparation, analysis, and interpretation of financial statements.

### **ACCT 202. Principles of Accounting. 3 Hours.**

PR: ACCT 201 with grade of C or better. Utilization of accounting information for purposes of managerial control and decision making; cost concepts, profit and financial budgeting, analysis of financial statements.

### **ACCT 244. Health Care Accounting. 3 Hours.**

PR: ACCT 201. Emphasis on hospital and other health care facilities' record keeping and reporting. Review of accounting cycle; balance sheet, income statement and cash flow statement; principles of fund accounting; principles of budgeting, cost finding and analysis; and interpretation of financial statements.

### **ACCT 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

### **ACCT 311. Intermediate Accounting. 3 Hours.**

PR: WVU sections require ACCT 201 and ACCT 202 with a grade of B- or better in each and PR or CONC: ACCT 321, WVUIT sections require ACCT 201 and ACCT 202 with a grade of C- or better. Development of accounting theory and practice, with emphasis on asset accounting.

### **ACCT 312. Intermediate Accounting. 3 Hours.**

PR: ACCT 311 with a grade of C- or better. Theory and practice of accounting for liabilities, revenue recognition, and stockholders' equity; financial statement preparation.

### **ACCT 323. Accounting Systems. 3 Hours.**

PR: ACCT 311. Analysis of data processing fundamentals and information systems analysis, design, and implementation, including necessary computer hardware and software components with particular reference to accounting information systems and the controls necessary there in.

### **ACCT 331. Managerial Accounting. 3 Hours.**

PR: ACCT 202 with a minimum grade of C-. This course is intended for non-accounting majors. Analysis of internal accounting practices with emphasis on use of data for performance evaluation, control, motivation, through accounting systems, and decision-making. (No credit available to students having credit for ACCT 431 and ACCT 432.)

### **ACCT 348. Financial Statement Analysis. 3 Hours.**

PR: ACCT 201. This course will include an in-depth review of financial statements; financial ratios and fraud analysis; industry average comparisons; financial services and library sources; and extended utility of ratios. Also listed as FIN 328.

### **ACCT 415. Advanced Accounting. 3 Hours.**

PR: ACCT 312 and (ACCT 321 or ACCT 323). Accounting for business combinations, consolidations, foreign currency translation, governmental and nonprofit entities, and equity method investment accounting.

### **ACCT 420. Fraud Examination. 3 Hours.**

PR: ACCT 201. An overview of fraud related concepts; management fraud; financial statement fraud; fraud prevention and detection techniques; elements of fraud investigation; and interviewing process.

### **ACCT 421. Fraud Management: Legal/Ethical Issues. 3 Hours.**

Offers a basic understanding of what motivates criminals to commit fraud; legal elements of fraud; rules of evidence; key legal rights and privacy issues; testifying; and non-control deterrence and methods used to implement it.

### **ACCT 422. Advanced Fraud Investigation & Analysis. 3 Hours.**

This course includes an in-depth review of techniques used in investigating financial fraud. Topics include: investigating theft and concealment; sources of information; interviewing and testifying.

### **ACCT 423. Information Security and Controls. 3 Hours.**

This course will cover security issues in a computerized environment. Topics include: security guidelines, implementation, and cost issues; risk management and control.

### **ACCT 430. Information Technology Auditing. 3 Hours.**

PR: ACCT 311 and ACCT 445 or consent. Information Technology (IT) audit overview, legal and ethical issues for IT auditors, risks & controls, deployment risks, managing the IT function, networks and telecommunication risks, e-business risks, using computer assisted audit tools and techniques, conducting the IT audit, fraud and forensic auditing.

### **ACCT 431. Cost Management. 3 Hours.**

PR: ACCT 202 with a minimum grade of B-. Strategic cost management concepts and techniques used for decision making, control, and product and service costing.

**ACCT 432. Advanced Cost Management. 3 Hours.**

PR: ACCT 202 or department consent. Advanced cost management concepts and techniques with emphasis on cost measurement systems and the evaluation and management of performance.

**ACCT 441. Income Tax Accounting 1. 3 Hours.**

PR: ACCT 311 with a minimum grade of C-. Federal income taxation of individuals emphasizing filing status, exemptions, gross income, deductions, credits, compensation, retirement savings, home ownership, property transactions, and investments.

**ACCT 442. Income Tax Accounting 2. 3 Hours.**

PR: ACCT 441 with a minimum grade of C-. Federal income tax treatment of corporations, pass through entities and their owners or beneficiaries, introduction to multistate and international taxation, and tax planning.

**ACCT 449. Case Studies in Fraud Examination and Management. 3 Hours.**

PR: ACCT 422. This capstone course integrates the knowledge and skills acquired during the fraud-related course work in the program. Several cases will be assigned for discussion and written analysis. Students will also be required to write a research paper.

**ACCT 450. Accounting Technology. 3 Hours.**

PR: ACCT 322 or ACCT 323. Survey and application of computerized accounting software systems set up, general ledger, accounts receivable, accounts payable, payroll, and preparation of financial statements.

**ACCT 451. Auditing Theory. 3 Hours.**

PR: ACCT 312. Standards and procedures related to the independent audit of financial statements.

**ACCT 461. Accounting for Nonbusiness Entities. 3 Hours.**

PR: ACCT 312 and (ACCT 321 or ACCT 323). Accounting, reporting, and budgeting for governmental and nonprofit entities and the use of fund accounting data for planning and control.

**ACCT 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**ACCT 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses. (Maximum of nine semester hours in any or all courses numbered 493 offered by the College of Business and Economics may be applied toward bachelor's and master's degree.)

**ACCT 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## **ADVENTURE RECREATION**

**ADRC 101. Essential Skills in Adventure Recreation. 3 Hours.**

This course focuses on foundational outdoor skills needed to safely participate in and lead trips in outdoor settings. Students learn and practice equipment selection and use, outdoor cooking, map & compass navigation and wilderness first aid in classroom and outdoor settings.

**ADRC 102. Adventure in Society. 3 Hours.**

This course explores how outdoor adventure has transformed from a daily necessity for survival in early cultures to its modern form of recreational pursuit. Through readings, media, lectures and hands-on adventure experiences students explore historical and modern perspectives of popular adventure pursuits and their societal influence.

**ADRC 103. Introduction to Adventure Recreation. 3 Hours.**

Overview of the adventure recreation industry including adventure tourism, instruction, guiding, sports and therapeutic applications. Examines motivations and trends of participation and professional employment opportunities in the field.

**ADRC 111. Introduction to Whitewater Rafting. 1 Hour.**

Introductory skills course in navigating class II-III whitewater in inflatable watercraft. Content includes equipment selection and care, river features and hazards, paddle strokes, steering, whitewater maneuvers and basic rescue techniques. Must meet essential eligibility requirements to participate.

**ADRC 112. Whitewater Rafting Techniques. 1 Hour.**

PR: ADRC 111 or permission of the instructor. Whitewater raft skill development course designed to build intermediate skills on class III-IV whitewater. Includes intermediate paddle raft maneuvers, oar-rig operation and self-recovery techniques. Must meet essential eligibility requirements to participate.

**ADRC 121. Introduction to Rock Climbing. 1 Hour.**

Introduction to rock climbing skills. Content includes skills necessary to climb and belay using a top-rope system both on artificial and natural climbing surfaces. Must meet essential eligibility requirements to participate.

**ADRC 122. Rock Climbing Techniques. 1 Hour.**

PR: ADRC 121 or permission of the instructor. Rock climbing skill development course focused on building proficiency for independent set-up and safe climbing practices in a top rope climbing setting. Must meet essential eligibility requirements to participate.

**ADRC 131. Introduction to Mountain Biking. 1 Hour.**

Introduction to mountain biking and riding techniques. Foundational content and practice on biking skills, etiquette, and technical knowledge. Must meet essential eligibility requirements to participate.

**ADRC 201. Leadership in Adventure Recreation. 3 Hours.**

PR: ADRC 101 and ADRC 103 or the permission of the instructor. Introduction to skills and techniques for leading small groups in outdoor settings. Content focused on program design, teaching techniques, guiding principles, group development and risk management.

**ADRC 211. Introduction to Whitewater Raft Guiding. 1 Hour.**

PR: ADRC 112 or permission of the instructor. Introduces methods and skills of commercial raft guiding on class III-IV whitewater. Emphasis is placed on customer care, building a short-term paddling team, effective communication and group safety. Must meet essential eligibility requirements to participate.

**ADRC 212. Swiftwater Rescue. 1 Hour.**

PR: ADRC 111 or permission of the instructor. Introductory theory and skills in self and group rescue techniques of paddlers in swiftwater settings. Instruction emphasizes recognition and avoidance of common river hazards, personal/group safety, throw bag use, rope/boat/wading-based rescues, rescue PFD use and mechanical advantage systems. Must meet essential eligibility requirements to participate.

**ADRC 221. Lead Climbing. 1 Hour.**

PR: ADRC 122 or permission of the instructor. Introduces experienced top rope climbers to techniques and skills required to lead climb bolted sport and traditional lead routes. Emphasis on safety practices, equipment, lead climbing knots, lead belay technique, bolt assessment, route finding, traditional gear placement and anchor cleaning. Must meet essential eligibility requirements to participate. Must have the ability to climb 5.8 on a top rope.

**ADRC 222. Climbing Rescue Techniques. 1 Hour.**

PR: ADRC 122 or permission of the instructor. Introduces theory and skills in self and group rescue for climbers in high angle terrain. Content includes vertical rescue management, belay escapes, ascending ropes, mechanical advantage systems, lowering systems, rescue rappels and counter-balance systems. Must meet essential eligibility requirements to participate.

**ADRC 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ADRC 301. Adventure Recreation Program Management. 3 Hours.**

PR: ADRC 103. Builds student knowledge and competency in the management of an adventure recreation enterprise. Emphasis is given to programmatic design, risk management, budgeting, staffing and support operations.

**ADRC 302. Adventure Travel and Tourism. 3 Hours.**

PR: ADRC 103 and PR or CONC: ADRC 301. Overview of the adventure travel industry from the perspective of consumer, provider and promoter. Emphasis given to market analysis, destination planning and business operations of adventure-based tourism products.

**ADRC 303. Management of Adventure Resources. 3 Hours.**

An introduction to professional practices in planning and managing natural and artificial adventure resource areas and facilities. Course includes lecture, venue site visits and project work focused on the relationship between program delivery and resource management.

**ADRC 304. Adventure Guiding and Instruction. 1 Hour.**

PR: Completion of a 300 level technical skill development course. Course focuses on assessment of technical skill and leadership abilities of student in preparation for completion of the guide/instructor co-curricular graduation requirement and general professional development.

**ADRC 311. Whitewater Raft Trip Leadership. 1 Hour.**

PR: ADRC 211 or permission of the instructor. Advanced skill course focused on methods and skills needed to lead whitewater paddling day trips primarily in rafts. Hands-on activities focus on site selection, equipment, logistics, permits, risk management, on-river trip management and group safety. Must meet essential eligibility requirements to participate.

**ADRC 321. Rock Climbing Instructor Development. 1 Hour.**

PR: ADRC 221 and must meet essential eligibility requirements to participate plus also have at least one year of personal climbing experience or permission of the instructor. Advanced skill course focused on development of instructional skills in rock climbing. Hands-on activities emphasize climbing site selection, risk management, technical skills as well as key instructional skills. Rock Climbing resume must show more than 20 single pitch traditional gear protected leads over 5.6 difficulty and can comfortably climb 5.8 routes on top rope at time of course.

**ADRC 401. Ethical and Legal Issues in Adventure Programming. 3 Hours.**

PR: ADRC 301. Examination of ethical and legal issues faced by program managers and field leaders in the development, administration and operation of adventure activities.

**ADRC 402. Research and Evaluation in Adventure Recreation. 3 Hours.**

PR: ENGL 101 and MATH 122. An introduction to research methods and research literature for studies in adventure recreation. Course examines physical and social science research that inform management practice in tourism, resources management and program development.

**ADRC 403. Senior Project - Capstone. 3 Hours.**

PR: Senior standing and permission of the instructor. This course is the culminating experience for Adventure Recreation Management majors through which they will demonstrate their ability to integrate and synthesize adventure program management competencies and industry knowledge with the completion of an original senior project, classroom discussions and applied program assessments.

**ADRC 491. Professional Field Experience. 1-18 Hours.**

(May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**ADRC 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ADRC 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

## **ART HISTORY**

**ARHS 101. Landmarks of World Art. 3 Hours.**

Introduction to the study of art history from prehistory to the present in which major landmarks of world art and architecture are considered as aesthetic objects, cultural documents and within their socio-historical contexts.

## **ATHLETIC COACHING EDUCATION**

**ACE 105. Nutrition for Coaches. 3 Hours.**

General nutrition and dietary requirements to aid coaches and their athletes.

**ACE 106. Athletic Coaching Education. 3 Hours.**

Overview of athletic coaching profession including careers opportunities, critical current issues/trends, professional standards and the professional organizations.

**ACE 168. Sport Officiating. 2 Hours.**

Study of the art, science, industry standards, and best practices of the officiating profession across all levels of sport.

**ACE 215. Sport for the Exceptional Athlete. 3 Hours.**

PR or CONC: PET 175 with a minimum grade of C-. Examines the past, present and future of sport for athletes with disabilities and those competing at the Masters-level. The focus is on the coaching of these unique populations of competitive and recreational athletes.

**ACE 256. Principles and Problems of Coaching. 3 Hours.**

Designed to teach students the principles and problems of interscholastic athletic coaching.

**ACE 265. Diversity and Sport. 3 Hours.**

Covers historical and current topics relevant to diversity in sport as it relates to current sport practices. Practical strategies for facilitating acceptance of diversity within individual/team sports are discussed.

**ACE 350. Career Planning In Sport. 3 Hours.**

Students will utilize the Career Service Center and demonstrate a working knowledge of various job search strategies and career planning.

**ACE 359. Techniques of Coaching: Track. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 361. Techniques of Coaching: Soccer. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 362. Techniques of Coaching: Basketball. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 364. Techniques of Coaching: Football. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 365. Techniques of Coaching: Baseball. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 366. Techniques of Coaching: Volleyball. 2 Hours.**

Designed to permit students to gain athletic coaching experience through a supervised on-site experience with a varsity athletic team.

**ACE 410. Training Theories for Coaches. 3 Hours.**

PR: PET 124 and PET 125 and PR or CONC: EXPH 365. Application of sport training theories to building, designing and assessing athlete training plans, seasonal team development and long term athlete development from physical literacy to peak performance at all participation levels.

**ACE 430. Coaching Education Administration. 3 Hours.**

An administrative focus of leadership, finance, fundraising, planning, facility development, personnel supervision, public relations, rules and regulations, purchase and care of equipment and the conducting of athletic events.

**ACE 468. Sport Movement Analysis. 3 Hours.**

PR: PET 124 and PET 125 with a minimum grade of C- in each. This course is designed to introduce a prospective coach to the principles of human movement.

**ACE 469. Basic Strength/Conditioning-Coaches. 3 Hours.**

PR: EXPH 365 and (EXPH 364 or (PET 124 and PET 125)) with a minimum grade of C- in each. Present basic exercise performance methodologies to assist in coaching athletics. Types of training include speed drills, agility drills, conditioning workouts, flexibility exercises, balance- improvement drills, and proper training-environment safety techniques.

**ACE 488. Practicum Coaching Exceptional Athletes. 3 Hours.**

PR: ACE 315. Integration of theoretical knowledge and development issues with practical field experiences working with exceptional athletes.

**ACE 489. Practicum Coaching Youth Sport. 3 Hours.**

PR: ACE 256, PET 244, and one of the ACE Techniques of Coaching. Integration of theoretical knowledge and development issues with practical field experiences in coaching youth.

**ACE 491. Professional Field Experience. 1-6 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**ACE 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ACE 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

**ACE 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## ATHLETIC TRAINING

**ATTR 121. Sport Injury Control and Management. 3 Hours.**

Training, conditioning, protection, and other injury prevention measures. First aid, emergency service, and care related to physical education and athletics.

## AVIATION MANAGEMENT

**AVIA 101. Private Pilot. 3 Hours.**

PR: Consent. Knowledge and skills necessary for a FAA private pilot certificate. Topics include aerodynamics, systems, regulations, airspace, performance, weather, flight publications, navigation, basic flight physiology, and flight safety. Flight training to obtain a private pilot certificate.

**AVIA 181. Professional Field Experience. 1-3 Hours.**

PR: Consent. Flight training conducted in conjunction with AVIA 101 necessary to obtain a FAA private pilot certificate.

**AVIA 201. Instrument Rating. 4 Hours.**

PR: Consent. Provides the knowledge required for an instrument rating. Includes instrument flight regulations, air traffic control system and procedures, instrument navigation and approaches, charts, weather, safety, aeronautical decision making, and crew resource management.

**AVIA 231. Commercial Pilot. 4 Hours.**

PR: Consent. Knowledge and skills required to obtain a FAA commercial pilot certificate. Topics include regulations, aerodynamics, metrology, performance, pilotage, dead reckoning, navigation aids, aeronautical decision making, aircraft systems, night and high altitude operations, and commercial maneuvers.

**AVIA 241. Multi-Engine Rating. 2 Hours.**

PR: Consent. Provides the knowledge and skills necessary to safely and proficiently exercise the privileges and responsibilities of a multi-engine aircraft rating. Includes multi-engine aircraft systems, multi-engine aerodynamics, weight and balance, aircraft performance, and abnormal/emergency procedures.

**AVIA 281. Professional Field Experience 2. 1-9 Hours.**

PR: Consent. Flight Training conducted in conjunction with most AVIA 200 level courses.

**AVIA 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**AVIA 301. Principles of Aviation Instruction. 3 Hours.**

PR: Consent. Fundamentals of learning, lesson plans, and the teaching equipment. Emphasis on the organization, composition, and presentation of lessons to individuals and groups in preparation for Fundamentals of Instruction knowledge examination and flight instructor practical test.

**AVIA 302. Initial Flight Instructor. 3 Hours.**

PR: Consent. Provides the knowledge and skills necessary to conduct flight and ground instruction. Includes subject areas necessary for a private and commercial pilot training, intensive instruction and practice in lesson plans, in-flight instruction, debriefing and analysis.

**AVIA 304. Instrument Flight Instructor. 2 Hours.**

PR: Consent. A study of the material required to teach the instrument rating combined with a study of teaching responsibilities and techniques. Topics include regulations, air traffic control, navigation, instrument approach procedures, weather, ADM, and CRM.

**AVIA 306. Advanced Flight Instructor. 1 Hour.**

PR: Consent. Provides the knowledge and skills necessary for adding an additional aircraft rating to the flight instructor certificate. Includes aircraft limitations & specifications, flight training differences, safety factors, effective evaluations, and flight instructor responsibilities.

**AVIA 351. Crew Resource Management. 3 Hours.**

PR: Consent. A study of human interactions that affect the safety of flight. Coursework emphasizes crew coordination, situational awareness, communication, workload management, decision making, and human error management essential to the safe operation of a professional crew.

**AVIA 352. ATP/Turbine Aircraft Operations. 3 Hours.**

PR: Consent. This course includes an in-depth study of regional jet systems, FMS navigation airline crew resource management and airline standard operating procedures. The topics covered apply to many regional jet aircraft and some turbo prop aircraft.

**AVIA 380. Aviation Weather. 3 Hours.**

A study of weather as it relates to aviation, with emphasis on weather concepts, reporting systems, forecasting systems, hazards, weather and flight planning, weather in relation to aircraft performance, and weather reporting hardware and software.

**AVIA 381. Professional Field Experience 3. 1-9 Hours.**

PR: Consent. Flight training conducted in conjunction with AVIA 241 and 300-level AVIA courses.

**AVIA 382. Aerodynamic and Aircraft Performance. 3 Hours.**

A study of the fundamental principles of aerodynamics and aircraft performance. Includes terminology, the four forces of flight, aerodynamic stall, stability and control, weight and balance, and flight at slow, transonic and supersonic speeds.

**AVIA 383. Aircraft Systems. 3 Hours.**

A detailed study of basic and advanced aircraft systems, including piston and turbine powerplants, electrical, hydraulic, fuel, lubrication, pneumatic, ignition, pressurization, landing gear, environmental, fire detection/ extinguishing, flight control, and brake systems.

**AVIA 385. Air Traffic Control and Airspace. 3 Hours.**

A study of the national airspace system and air traffic control, includes the US air traffic control system, communication systems, ATC procedures, regulations, navigational equipment, tower operations, TRACON and center operations, and environmental issues.

**AVIA 480. Human Factors in Flight. 3 Hours.**

A comprehensive look at human factors in aviation, including the meaning of human factors; human error; fatigue, body rhythms & sleep; fitness & performance; vision & visual illusions; motivation & leadership; communication; attitudes & persuasion; training & training devices; education & application. (web course).

**AVIA 483. Air Transportation. 3 Hours.**

A comprehensive review of the history and role of air transportation. Topics include historical and present status of air transport; regulation and administration of the industry; perspectives on pilots, mechanics, operators, and owners; and evolution of aviation law, aircraft safety, facilities, security, and labor relations. (web course).

**AVIA 484. Aviation Safety. 3 Hours.**

Provides practical guidance on aircraft command techniques used during routine and unexpected situations. Includes the role of captain, characteristics of effective leaders, judgement and decision skills, management of resources, communication techniques and emergency situations.

**AVIA 485. Aviation Economics. 3 Hours.**

Middle and upper management decision making in a volatile airline industry. Topics include output, unit cost, traffic, and yield; operating expenses and relationships driving profit and loss. (web course).

**AVIA 486. Aviation Management and Leadership. 3 Hours.**

Explores management methods used by aviation crew, management, suppliers, service providers, and manufacturers. Focuses on decision analysis, decision research, peer-to-peer communication, sales management, emotional intelligence, and the Johari Window.

**AVIA 487. Aviation Security. 3 Hours.**

PR: Consent. Presents basic information on security issues and concerns in the aviation industry. It includes the historical aspects of aviation security, information on current security operations and information on the security tools used within the industry.

**AVIA 488. Aviation Stories: Aviation and the Humanities. 3 Hours.**

An understanding of how the business of flying and flying for pleasure have influenced literature; readings from journals, memoirs, fiction, and nonfiction dealing with the human side of aviation.

**AVIA 489. Aviation Law. 3 Hours.**

Overview of basic principles of U. S. law, with an emphasis on application of principles of aviation transactions and activities; recognition and avoidance of common legal pitfalls in aviation; and practical knowledge and understanding of basic legal concepts for managers, pilots, and mechanics; legal ramifications on administrative law, labor relations, airspace, and airport management. (web course).

## **BIOLOGY**

**BIOL 105. Environmental Biology. 3 Hours.**

(Intended for non-biology majors.) Population growth and human impacts on the environment, including ecosystem destruction, biological diversity, pollution, and global climate change are explored to obtain the concepts necessary to understand complex environmental issues of our time.

**BIOL 107. Biotechnology and Society. 3 Hours.**

An overview of the use of biotechnology to solve agricultural, medical, and environmental problems. Bioethical concerns and societal impacts of the use of the technologies will be discussed.

**BIOL 111. General Biology. 4 Hours.**

PR or CONC: ENGL 101. A comprehensive introductory course investigating the major areas of modern biology including scientific method, biological molecules, cell structure and function, histology metabolism and the anatomy and physiology of animals. Laboratory exercises include vertebrate dissection.

**BIOL 112. General Biology. 4 Hours.**

PR:BIOL 111. A continuation of BIOL 111. Principles of inheritance, molecular genetics, survey of plant and animal diversity, evolution, and ecology. Plant anatomy and physiology.

**BIOL 122. Human Sexuality. 3 Hours.**

A study of biological, behavioral and societal aspects of sexuality. Issues considered include changing fecundity, social-legal implications, sex roles, sexually transmitted diseases, populations, erotica, aging, dysfunctions, and decision- making skills for sex related issues.

**BIOL 193. Special Topics. 6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**BIOL 225. Biology Methods. 3 Hours.**

An introduction to scientific thinking, hypothesis generation, design of experiments, analysis of data, literature search, and writing a research paper. Includes basic laboratory safety and lab and field skills for biologists.

**BIOL 230. Human Anatomy and Physiology 1. 4 Hours.**

PR: PSC sections require BIOL 102 and BIOL 104 or nursing major or consent, WVUIT sections require BIOL 112. The study of human body structure and function. Lecture emphasizes the integumentary, skeletal, muscular, and nervous systems, and special senses. Laboratory includes a complete cat dissection.

**BIOL 231. Human Anatomy and Physiology 2. 4 Hours.**

PR: PSC sections require BIOL 230 and Nursing major or consent, WVUIT sections require BIOL 230. A continuation of BIOL 230. The following systems are thoroughly studied: endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive. Laboratory work involves physiological investigations and dissections.

**BIOL 233. Anatomy and Physiology. 4 Hours.**

PR:(BIOL 101 and BIOL 103) or English ACT of 18 or ENGL 101 as co-requisite and CHEM 113 or higher. A survey of cellular & organismal structure and function of the human body. Mammal dissection required.

**BIOL 240. Microbiology. 4 Hours.**

PR: BIOL 112 or BIOL 231 or CHEM 116. Comprehensive introduction to the biology of microorganisms with special emphasis on bacteria and viruses. Includes aspects of disease prevention and control, and human immunology. Laboratory exercises on physiology, identification, and culturing of bacteria.

**BIOL 303. Genetics. 4 Hours.**

PR: BIOL 112 and MATH 126. A comprehensive course covering aspects of both classic and modern genetics, including heredity, molecular genetics, and population genetics. Laboratory exercises investigate basic principles of inheritance, manipulation of DNA and bioinformatics.

**BIOL 336. Vertebrate Embryology. 4 Hours.**

PR: BIOL 112 or BIOL 219. An experimental and descriptive analysis of vertebrate development. Students on the Morgantown campus will be required to complete BIOL 219.

**BIOL 338. Behavioral Ecology. 3 Hours.**

PR: BIOL 112 or BIOL 221. Consideration of the influences of environmental factors on short-and long-term regulation, control, and evolution of the behavior of animals. Students on the Morgantown campus will be required to complete BIOL 221.

**BIOL 343. Systematic Zoology. 4 Hours.**

PR: BIOL 112 and CHEM 115. Phylogeny, taxonomy and morphology of invertebrate and vertebrate phyla. Collection, dissection and preservation of specimens.

**BIOL 347. Parasitology. 4 Hours.**

PR: BIOL 112. The study of parasites and their effects on their host. Parasites of major medical importance to humans and their companion/agricultural animals; evolutionary relationships between parasites and hosts. Laboratory will include observations of preserved and live (if possible) specimens and discussions of current research on evolution of host/ parasite relationships.

**BIOL 354. Organismal Botany. 4 Hours.**

PR:BIOL 112 and CHEM 115. Anatomy, growth, reproduction, and biochemical and physiological processes of higher plants; survey of algae, fungi, nonvascular and vascular plants. Laboratory exercises on anatomy, physiology, and ecology of plants.

**BIOL 416. Cell Biology. 4 Hours.**

PR:BIOL 112 and (CHEM 112 or CHEM 116). Study of the structure and function of prokaryotic and eukaryotic cells with an emphasis on eukaryotes. Areas of focus include biological molecules, membrane structure and function, intracellular sorting, the cytoskeleton, cell adhesion, cell signaling, and bioenergetics. Also includes an introduction to the cells of the immune system, cell death, and cancer.

**BIOL 417. Biotechnology. 4 Hours.**

PR:BIOL 112 and (CHEM 112 or CHEM 116) Study of the structure, function, and regulation of DNA with an emphasis on recombinant DNA technology and related techniques that are used to analyze and manipulate DNA, RNA, and proteins. Also covered are applications of this technology in agriculture, industry, medicine, forensics and scientific discovery. Examination of appropriate research papers from the scientific literature illustrates the use of specific techniques.

**BIOL 440. Comparative Anatomy. 4 Hours.**

PR: WVU sections require BIOL 219 and BIOL 221 or consent, WVUIT sections require BIOL 112. A functional and evolutionary study of vertebrate structure. (Dissection kit required.)

**BIOL 442. Organismal Zoology. 4 Hours.**

PR:BIOL 102 and BIOL 104 and CHEM 116. Mechanisms of environmental adaptation. Physiology, behavior and zoogeography. Laboratory experiments.

**BIOL 452. Plant Taxonomy. 4 Hours.**

PR:BIOL 112. Classification, phylogeny and morphology of vascular plants. Laboratory and field trip emphasis on West Virginia flora.

**BIOL 454. Immunology. 3 Hours.**

PR: BIOL 240 or BIOL 219. Explores the fundamental principles and practices of immunology including how the immune system is organized, how it functions to keep us healthy, and how it can cause allergies and autoimmune disease.

**BIOL 461. Principles of Evolution. 3 Hours.**

PR: BIOL 112 or BIOL 221. Introduction to the study of evolution, including genetics of evolutionary change, speciation and adaptation molecular evolution, the history of life, extinction, co-evolution and the origins of humans. Students on the Morgantown campus will be required to complete BIOL 221.

**BIOL 466. Ecology. 4 Hours.**

PR: BIOL 112 and CHEM 116. Principles of environmental biology, population dynamics and evolution. Field trips and lab work.

**BIOL 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**BIOL 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

**BIOL 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**BIOL 497. Research. 1-6 Hours.**

Independent research projects.

## **BUSINESS ADMINISTRATION**

**BUSA 101. Introduction to Business. 3 Hours.**

An introduction to the contemporary business world, including international and small business, quality, ethics, and career preparation. The role of accounting, economics, finance, management, and marketing activities are investigated.

**BUSA 242. Intermediate Accounting 1. 3 Hours.**

PR:ACCT 202. A review of the principles and concepts developed in the introductory course in accounting. Work sheet adjustments and the presentation of financial statements with various formats. Introduction of additional valuation accounts relating to receivables, inventories, and payables. In-depth study of inventory costing and valuation. Appropriate software used to solve and analyze accounting problems.

**BUSA 243. Intermediate Accounting 2. 3 Hours.**

Theory and practice with respect to accounting for liabilities and stockholders equity.

**BUSA 244. Cost Management 1. 3 Hours.**

Cost concepts, behavior and estimation; accounting systems for activity-based costing; analysis for decision-making; inventory management.

**BUSA 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**BUSA 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

## **BUSINESS CORE**

**BCOR 320. Legal Environment of Business. 3 Hours.**

Explores the relationship of law, government and ethics to business enterprise. Provides overview of legal and ethical issues relevant to business decision-making and planning and the government regulations of business.

**BCOR 340. Principles of Finance. 3 Hours.**

Time Value of Money is applied to decision making in business and personal finance. Additionally, students learn common valuation techniques and financial planning.

**BCOR 350. Principles of Marketing. 3 Hours.**

Overview of marketing and the interrelationships between marketing and other business disciplines. Topics include the management of the product, communication, price, and distribution variables as well as introduction to buyer behavior and marketing research.

**BCOR 360. Supply Chain Management. 3 Hours.**

The course acquaints students with a variety of supply chain management key concepts, to include purchasing, logistics, competitiveness, location, inventory, forecasting, layout, production and operations management concepts and techniques.

**BCOR 370. Managing Individuals and Teams. 3 Hours.**

Topics include traditional management functions, employee motivation, leadership, team dynamics, individual and group decision-making, and individual differences. Additional topics include social responsibility and ethics, diversity, organizational structure and design, organizational control, and managing innovation and change.

**BCOR 460. Contemporary Business Strategy. 3 Hours.**

PR: BCOR 320 and (BCOR 340 or FIN 325) and BCOR 350 and BCOR 360 and BCOR 370. The course focuses on the total organization and strategy development and execution that lead to the achievement of the organization's objectives and a superior position in the competitive environment in which it operates.

**BUSINESS LAW****BLAW 400. Personnel Relations and the Law. 3 Hours.**

PR: BCOR 320 or consent. The legal principles guiding employer-employee relations, including agency law and the laws regulating employee health, safety, compensation, and benefits, job opportunity, and labor organizing.

**BLAW 420. Law for the Certified Public Accountant. 3 Hours.**

PR: BCOR 320. (Credit cannot be received for both BLAW 310 and BLAW 420.) A survey of those areas of commercial and regulatory law with which accountants need familiarity in order to exercise good judgement, practice their profession skillfully and understand their professional responsibility.

**CAREER-TECHNICAL EDUCATION****CTED 100. Teacher Education Orientation. 1 Hour.**

College regulations, State Department of Education Policies and Certifications, effective study habits, use of resources, career opportunities.

**CTED 201. Introduction to Career Technical Education. 3 Hours.**

Purpose, nature and scope of vocational education for the vocational teacher. General orientation to career technical education instruction.

**CTED 301. Occupational Analysis. 3 Hours.**

Analysis procedures for determining career technical curriculum content, determination of course goals and objectives. Involvement of advisory committees in career technical education.

**CTED 302. Course Construction and Planning in Career Technical Education. 3 Hours.**

Analysis procedures for determining vocational curriculum content. Determination of course goals and objectives. Involvement of advisory committees for vocational education. Factors, principles, and techniques of developing a course of study for a career-technical education program.

**CTED 303. Organization and Management of School Shops and Laboratories. 3 Hours.**

Responsibilities of the teacher as a manager, methods of handling tools and supplies, problems of effective shop organization and maintenance, safety administration, job evaluation and selection, group control and management.

**CTED 304. Safety in Career Technical Education. 3 Hours.**

Responsibilities of the teacher in providing a safe learning /working environment for career technical students. The study of effective approaches to accident prevention and an introduction to the laws and regulatory agencies regarding safety management in the classroom and laboratory.

**CTED 305. Methods of Examination in Career Technical Education. 3 Hours.**

An introduction to the methods and techniques for developing and administering written and performance tests. Course includes the charting of student progress and methods for determining student grades for a grading period.

**CTED 306. Coordination of Cooperative Career Technical Education. 3 Hours.**

Background of coordination of cooperative part-time students. Methods and techniques for evaluating and selecting work stations, student selection, placement and follow-up. Role and use of advisory committees, and methods of evaluating a cooperative work experience program.

**CTED 307. Computer Applications in Career Technical Education. 3 Hours.**

This course is designed to introduce students to computer-based instructional technology used in today's classrooms and labs. Included is an introduction to operating systems, application software for instruction, and instructional management.

**CTED 308. Application of Basic Skills in Career Technical Education. 3 Hours.**

Methods, techniques and strategies for incorporating the reinforcement of basic skills in career technical instructional program. Emphasis will be placed on reading, writing, math, oral communication, and critical thinking skills as they apply to occupational specific training. Also addressed in this course is the teaching of job seeking and job keeping skills.

**CTED 402. History and Philosophy of Career Technical Education. 3 Hours.**

Historical influences in the development of vocational education in America and Europe; motivating influences and the implications of philosophy in modern career technical education.

**CTED 404. Career Technical Guidance. 3 Hours.**

Theories, background, and practices of vocational guidance including; promotion, selection of occupations, training programs, placement responsibilities, and follow-up techniques. Relationships between vocational guidance programs and educational and community agencies, including vocational-technical education.

**CTED 409. Coordination of Career Technical Youth Activities. 3 Hours.**

Purpose and scope of VICA and other youth organizations. Application of youth activities within the related classroom instruction in vocational-technical education. Current trends in the development and movement of youth activities in America.

**CTED 410. Career Education. 3 Hours.**

Analysis of the role of career-technical education within the area of career education. Organizing a plan for including career-technical education.

**CTED 411. Supervision of Career Technical Education. 3 Hours.**

Supervisory techniques for local, area and state levels; analysis of supervisory needs, duties and responsibilities, cooperation between school, labor management, and public agencies. Emphasis on improvement of instruction.

**CTED 413. Advanced Materials for Career Technical Education. 3 Hours.**

Particular emphasis on developing individually prescribed instructional materials for special teaching areas. Time available for each student to work on an individual basis to complete work assignment.

**CTED 414. Metrics in Career Technical Education. 3 Hours.**

The SI" metric system, relationship between metric and decimal systems, metric terminology, metric applications in length, area, volume, mass, and temperature, metric to metric conversion, imperial to metric conversions, teaching the metric system, application of the metric system to career technical specializations.

**CTED 415. Audio/Visual Productions in Career Technical Education. 3 Hours.**

Developing audio/visual equipment. Designing, programming and editing audio/visual productions for career technical teacher education.

**CTED 417. Principles and Techniques in Career Technical Education. 3 Hours.**

A study of the concepts of Industrial Education. The development of questioning and answering techniques in the vocational setting. The selection and correlation of teaching aids.

**CTED 418. Demonstrations for Teachers in Career Technical Education. 3 Hours.**

The presentation of specific demonstration to selected teachers and student in the vocational teacher's specialization. Critiquing demonstrations of others and comparing techniques employed.

**CTED 419. Observations for Teachers in Career Technical Education. 3 Hours.**

Classroom visitations and written critiques of shops and laboratories in the teacher skill specialization. Observations of the industrial application of job skills in the teacher's specialization. Comparison of industrial and vocational education shops and laboratories.

**CTED 420. School-Community Relations in Career Technical Education. 3 Hours.**

Organization and planning for a program of school-community relations by the vocational teacher. Emphasis on preparing brochures, displays, news articles, conducting open house activities and working with members of the community.

**CTED 421. Teaching Special Students in Career Technical Education. 3 Hours.**

Instructional planning for individual student needs. Special instructional techniques, and modification of the learning environment/physical setting for special students in career technical education.

**CTED 422. Back to Industry Experience. 1-6 Hours.**

An occupational specialization updating experience for the in-service, career technical teacher. In-service teacher will gain new knowledge and skill in an occupational specialization through back-to-industry experience. Hours of credit will vary according to the depth and magnitude of the experience. Credit shall be earned on a pass/fail basis.

**CTED 423. Industrial Processes. 1-3 Hours.**

Special seminars or workshops designed for specific occupational specializations updating. Special topics shall be designed to provide the in-service, career technical teacher with new knowledge and skill currently required of workers in business and industry. Hours of credit will vary according to the depth and magnitude of the training. Credit shall be earned on a pass/fail basis.

**CTED 423A. Industrial Processes. 1-3 Hours.**

**CTED 423B. Industrial Processes. 1-3 Hours.**

Special seminars or workshops designed for specific occupational specializations updating. Special topics shall be designed to provide the in service, career technical teacher with new knowledge and skill currently required of workers in businee and industry. Hours of credit will vary according to the depth and magnitude of the training. (Credit shall be earned on a pass/fail basis.).

**CTED 423C. Industrial Processes. 1-3 Hours.**

Special seminars or workshops designed for specific occupational specializations updating. Special topics shall be designed to provide the in-service, career technical teacher with new knowledge and skill currently required of workers in business and industry. Hours of credit will vary according to the depth and magnitude of the training. (Credit shall be earned on a pass/fail basis.).









**CTED 425F. Industrial Processes. 1-3 Hours.**

Special seminars or workshops designed for specific occupational specializations updating. Special topics shall be designed to provide the in-service, career technical teacher with new knowledge and skill currently required of workers in business and industry. Hours of credit will vary according to the depth and magnitude of the training. Credit shall be earned on a pass/fail bases.

**CTED 485. Teaching Methods in Career Technical Education. 3 Hours.**

Correlating shop/lab instruction with classroom instruction. Individual and group instruction using various instruction sheets and materials. Emphasis is given to the four teaching steps in career technical education. Physical factors relating to classroom and shop/lab methods and techniques.

**CTED 486. Senior Project. 3-4 Hours.**

PR: Consent. Design and completion of Interdisciplinary Project. Requires approval of faculty committee.

**CTED 493. Special Topics. 1-6 Hours.**

Investigation of topics not covered in regularly scheduled courses.

**CHEMICAL ENGINEERING****CHE 100. Introduction to Chemical Engineering. 2 Hours.**

Introduction to engineering practice with an emphasis on Chemical Engineering. Course projects are designed to develop problem solving, teamwork, and communication skills. Project and laboratory work will be provided to demonstrate engineering concepts.

**CHE 211. Material Balances. 3 Hours.**

PR: CHEM 116 and PR or CONC: MATH 155. Introduction to chemical engineering fundamentals and calculation procedures, with emphasis on industrial stoichiometry.

**CHE 212. Energy Balances. 3 Hours.**

PR: CHE 201 or CHE 211. Continuation of topics from CHE 211, with an emphasis on energy balances.

**CHE 316. Transport Operations. 4 Hours.**

PR: MATH 156 and PHYS 111. Physical phenomena associated with the movement and processing of fluids, and the generation and transport of thermal energy. Emphasis on quantitative models to design engineering systems and predict performance. Applications of these principles will be demonstrated in a variety of natural and engineering systems.

**CHE 317. Transport Operations 2. 4 Hours.**

PR: (CHE 316 or (CHE 310 and CHE 311)) and CHE 320. Continuation of CHE 316 with emphasis on mass transfer theory and its application to process operations.

**CHE 318. Particle Processing Operations. 3 Hours.**

PR: CHE 316 or (CHE 310 and CHE 311). Physical Phenomena associated with the movement and processing of particulate solids. Fluid-solid separations, particle formation, solids transport and storage.

**CHE 320. Chemical Engineering Thermodynamics. 3 Hours.**

PR: ((CHE 202 and CHE 230) or CHE 212) and MATH 251. First and second laws of thermodynamics. Thermodynamic functions for real materials. Physical equilibrium concepts and applications. (2 hr. lec., 2 hr. calc. lab.).

**CHE 327. Kinetics and Reactor Design. 3 Hours.**

PR: CHE 320. Kinetic models applied to the analysis and design of chemical reactors. Kinetic rate theory, homogeneous reactions in batch and flow systems, heterogeneous reactions and catalysis. Use of stirred tank and plug flow reactor models, temperature effects, effect of heat transfer, and catalytic reactors. Computer modeling is emphasized for design and analysis.

**CHE 330. Modeling and Analysis. 3 Hours.**

PR: MATH 156. Topics include mathematical modeling of systems, numerical solution of algebraic and differential equations, approximation of mathematical relations.

**CHE 350. Chemical Engineering Laboratory. 2 Hours.**

PR: CHE 316 or (CHE 310 and CHE 311). Planning of experiments, data collection, statistical analysis of experimental data, and reporting of results.

**CHE 357. Design Laboratory 1. 2 Hours.**

PR or CONC: CHE 316 and CHE 320. Analysis and synthesis in the design of processing systems and products. Economic evaluation, project management, flowsheet development, equipment selection, equipment specification, optimization, computer-aided design, process operability and control, process safety, and environmental protection. Team and individual projects are primary vehicles for assessment and skill development.

**CHE 358. Design Laboratory 2. 2 Hours.**

PR: CHE 357 and PR or CONC: CHE 317 and CHE 327. Continuation of CHE 357. Emphasis on equipment selection, equipment specification, optimization and computer-aided design.

**CHE 411. Advanced Heat Transfer. 3 Hours.**

PR: (CHE 311 or CHE 316) or MAE 423. Heat Transmission in the processing industries, with an emphasis on the design of equipment used to reclaim thermal energy, supply process energy needs, and remove heat in critical cooling operations.

**CHE 417. Advanced Separation Processes. 3 Hours.**

PR: CHE 312 or CHE 317. Analysis and design of diffusional separation operations. Solution of mathematical models of binary and multi-component separations, equipment selection, energy consumption, and selection of appropriate thermodynamic models. Computer-aided design is emphasized.

**CHE 426. Multiphase Reactor Design. 3 Hours.**

PR: CHE 327 A study of multiphase reactor designs, with particular emphasis on fluidized and packed bed catalytic reactors. Development of kinetic models. Evaluation of mixing, heat transfer, and mass transfer effects on reactor scale-up. Reactor modeling and numerical solution will be used to augment design and analysis studies.

**CHE 435. Chemical Process Control. 3 Hours.**

PR: (CHE 230 or CHE 330) and (CHE 325 or CHE 327). Transient behavior of chemical process flow systems, linearization and stability. Process control system design including frequency response analysis. Instrumentation and hardware.

**CHE 450. Unit Operations Laboratory 1. 2 Hours.**

PR: (CHE 310 and CHE 311 and CHE 312 and CHE 325 and CHE 351) or (CHE 317 and CHE 350). Operation of chemical process engineering equipment; collection, analysis, and evaluation of laboratory report preparation. (4 hr. lab.).

**CHE 451. Unit Operations Laboratory 2. 2 Hours.**

PR: CHE 450. Continuation of CHE 450. (4 hr. lab.).

**CHE 457. Design Laboratory 3. 3 Hours.**

PR: CHE 358. Continuation of CHE 358. Emphasis on project management, product design and development of manufacturing schemes for products.

**CHE 458. Design Laboratory 4. 3 Hours.**

PR: CHE 457. Continuation of CHE 457. Emphasis on a complete conceptual process design including process control strategy, safety systems, and environmental protection.

**CHE 461. Polymer Science and Engineering. 3 Hours.**

PR: CHEM 233. Polymer classification, polymer synthesis, molecular weights and experimental techniques, thermodynamics, rubber elasticity, mechanical behavior, crystallization, diffusion, rheology, extrusion and injection molding. (3 hr. lec.).

**CHE 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**CHE 496. Senior Thesis. 1-3 Hours.**

PR: Consent.

## CHEMISTRY

**CHEM 101. Introduction to Chemistry Lab. 2 Hours.**

Recommended for students whose performance on a departmental placement examination indicates need for introduction work before enrolling in other chemistry courses. Scientific terminology and concepts; chemical arithmetic; chemical symbols, formulae and equations; mole concepts; problem solving. May not count for credit toward graduation if taken after credit for another course in chemistry has been earned.

**CHEM 111. Survey of Chemistry 1. 3 Hours.**

PR or CONC: CHEM 111L, WVU sections require PR or CONC: MATH 124 or MATH 126, (including 126 A, B, or C) with a minimum grade of C-, or a higher Math class, or ALEKS Score of 45, or Math ACT Score of 22, or Math SAT Score of 540 or Math SAT of 510 (Pre-March 2016), WVUIT and PSC sections require MATH 122 with a minimum grade of C- or ML 10, or Math ACT Score of 19 or Math SAT Score of 460 or Math SAT (March 2016) Score of 500 or PR or CONC: MATH 124 or MATH 126, (including 126 A, B, or C) or MATH 129 or MATH 150 or MATH 153 or MATH 155. Designed primarily for students taking only one year of college chemistry. Atomic structure; chemical bonding; acids, bases, and salts; periodicity; properties of gases, liquids, and solids; stoichiometry; oxidation-reduction. (3 hr. lecture).

**CHEM 111L. Survey of Chemistry 1 - Laboratory. 1 Hour.**

PR or CONC: CHEM 111. Survey of Chemistry 1 - CHEM 111 Laboratory.

**CHEM 112. Survey of Chemistry 2. 3 Hours.**

PR: CHEM 111 and PR or CONC: CHEM 112L. Continuation of CHEM 111. Nuclear chemistry; air and water pollution; useful natural materials; consumer chemistry; introduction to organic and biochemistry. (3 hr. lec.).

**CHEM 112L. Survey of Chemistry 2 - Laboratory. 1 Hour.**

PR or CONC: CHEM 112. Survey of Chemistry 2 - CHEM 112 Laboratory.

**CHEM 113. Fundamentals of Chemistry. 4 Hours.**

Fundamentals of inorganic, organic, and biological chemistry. Oriented toward the needs of associate degree level, health profession programs.

**CHEM 115. Fundamentals of Chemistry. 3 Hours.**

PR: Satisfactory ACT/SAT or placement exam performance, or WVU sections require CHEM 110B with a minimum grade of C- or MATH 129 or higher with a minimum grade of C-, PSC sections require MATH 124 or MATH 126 or PR or CONC: MATH 128 or higher with a minimum grade of C-, WVUIT sections require PR or CONC: MATH 126 or MATH 129, and PR or CONC: CHEM 115L. For students who need more than one year of college chemistry and quantitative relationships on which subsequent chemistry courses are built. (3 hr. lec.) (Students may not receive credit for CHEM 117 and CHEM 115.) Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**CHEM 115L. Fundamentals of Chemistry 1 - Laboratory. 1 Hour.**

PR or CONC: CHEM 115. Fundamentals of Chemistry 1 - CHEM 115 Laboratory.

**CHEM 116. Fundamentals of Chemistry. 3 Hours.**

PR: CHEM 115 and CHEM 115L and PR or CONC: CHEM 116L with a minimum grade of C- in all. Continuation of CHEM 115 & CHEM 115L. (3 hr. lec., 3 hr. lab.) (Students may not receive credit for CHEM 118 and for CHEM 112 or CHEM 116.) Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**CHEM 116L. Fundamentals of Chemistry 2 - Laboratory. 1 Hour.**

PR or CONC: CHEM 116. Fundamentals of Chemistry 2 - CHEM 116 Laboratory.

**CHEM 215. Introductory Analytical Chemistry. 3 Hours.**

PR: CHEM 116 and CHEM 116L with a minimum grade of C- in each and PR or CONC: CHEM 215L. Volumetric analysis, gravimetric analysis, solution equilibria, spectrophotometry, separations, and electrochemical methods of analysis. (Students may not receive credit for CHEM 215 and for CHEM 117 and CHEM 118.).

**CHEM 215L. Introductory Analytical Chemistry Laboratory. 1 Hour.**

PR: CHEM 116 and CHEM 116L with a minimum grade of C- in each and PR or CONC: CHEM 215. Volumetric analysis, gravimetric analysis, solution equilibria, spectrophotometry, separations, and electrochemical methods of analysis.

**CHEM 233. Organic Chemistry. 3 Hours.**

PR: (CHEM 116 or CHEM 118) and PR or CONC: CHEM 235 with a minimum grade of C- in all. Basic principles of organic chemistry. Modern structural concepts, the effect of structure on physical and chemical properties, reactions and their mechanisms and application to syntheses. (3 hr. lec.) (Students may not receive credit for CHEM 233, CHEM 234, and for CHEM 231.).

**CHEM 234. Organic Chemistry. 3 Hours.**

PR: CHEM 233 and CHEM 235 and PR or CONC: CHEM 236 with a minimum grade of C- in all. Continuation of CHEM 233 and its study of basic principles of organic chemistry. Modern structural concepts, the effect of structure on physical and chemical properties, reactions and their mechanisms and application to syntheses. (3 hr. lec.).

**CHEM 235. Organic Chemistry Laboratory. 1 Hour.**

PR or CONC: CHEM 233 with a minimum grade of C-. Fundamental organic reactions and the preparation of organic compounds. (3 hr. lab.).

**CHEM 236. Organic Chemistry Laboratory. 1 Hour.**

PR: CHEM 233 and CHEM 235 and PR or CONC: CHEM 234 with a minimum grade of C- in all. Continuation of CHEM 235 and its study of fundamental organic reactions and the preparation of organic compounds. (3 hr. lab.).

**CHEM 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**CHEM 310. Instrumental Analysis. 3 Hours.**

PR: (CHEM 215 or CHEM 118) and (CHEM 341 or CHEM 346). Lectures and demonstrations. Fundamentals of instrumental methods applied to chemical analyses: electrochemistry, spectroscopy, mass spectrometry, and chromatography. (2 hr. lec., 1 hr. demonstration.).

**CHEM 313. Instrumental Analysis Laboratory. 1 Hour.**

PR: CHEM 310. Practical application of modern instrumental methods to problems in chemical analysis. (3 hr. lab.).

**CHEM 346. Physical Chemistry. 3 Hours.**

PR: CHEM 234 and MATH 156 and PHYS 112. A first course in physical chemistry. Topics include a study of thermodynamics and chemical equilibria. (3 hr. lec.) (Students may not receive credit for CHEM 346 and for CHEM 341.).

**CHEM 347. Physical Chemistry Laboratory. 1 Hour.**

PR: (CHEM 118 or CHEM 215) and CHEM 346. Experimentation illustrating the principles of physical chemistry and offering experience with chemical instrumentation. (One 3 hr. lab.).

**CHEM 348. Physical Chemistry. 3 Hours.**

PR: CHEM 346 and MATH 251. Continuation of CHEM 346. Chemical dynamics and the structure of matter. (3 hr. lec.) (Students may not receive credit for CHEM 348 and for CHEM 341.).

**CHEM 349. Physical Chemistry Laboratory. 2 Hours.**

PR: CHEM 346 and CHEM 347 and CHEM 348. Continuation of CHEM 347. (Two 3 hr. lab.).

**CHEM 422. Intermediate Inorganic Chemistry. 3 Hours.**

PR: CHEM 341 or (CHEM 346 and CHEM 348). Structure, bonding, and reactivity of compounds of main-group and transition metal elements. Molecular structure and symmetry, solid state chemistry, ligand field theory, and coordination chemistry. (3 hr. lec.).

**CHEM 423. Inorganic Synthesis Laboratory. 2 Hours.**

PR: CHEM 422. Application of modern synthetic and spectroscopic methods of analysis to the preparation and characterization of main group, solid-state, transition metal, and organometallic compounds. (Two 3 hr. lab.).

**CHEM 451. Biochemistry. 3 Hours.**

PR: CHEM 234 or consent. Protein structure, conformation, and dynamics. Enzymes and their reaction mechanisms. Carbohydrate and fatty acid genesis and metabolism. Biosynthesis of macromolecular precursors. Information storage, transmission and expression genetics.

**CHEM 490. Teaching Practicum: Peer-Led Team Learning. 1-3 Hours.**

PR: Consent. Teaching practice as a tutor or assistant.

**CHEM 490A. Teaching Practicum-CLC. 1-3 Hours.**

PR: Consent. Teaching practice as a tutor or assistant.

**CHEM 493. Special Topics. 6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**CHEM 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

## **CIVIL ENGINEERING**

**CE 204. Surveying. 3 Hours.**

PR: MATH 126 and MATH 128 and DRET 120. The measurement of distances, directions, elevations and areas on the earth's surface; introduction to route surveying; introduction to computer programs for surveying.

**CE 310. Civil Engineering Materials. 3 Hours.**

PR: MAE 243. Physical, chemical, and molecular properties of materials commonly used in civil engineering works. Influence of these properties on the performance and use of materials.

**CE 312. Construction Materials. 3 Hours.**

PR: MAE 243. A study of civil engineering materials, metals and alloys, mineral aggregates, cements, concrete and concrete products, bituminous materials, lumber and timber, and testing of materials.

**CE 331. Transportation Engineering. 3 Hours.**

PR: MAE 242 and CE 204. Introduction to integrated transportation systems, vehicle, roadway and human characteristics, traffic engineering studies, intersections and interchanges, highway geometric design, highway pavement design, transportation planning, highway capacity analysis and evaluation of alternatives.

**CE 347. Introduction to Environmental Engineering. 4 Hours.**

PR: WVU sections require CHEM 115 and MATH 251 with a minimum grade of C- in each, WVUIT sections require MAE 331 and CHEM 116. Introduction to physical, chemical, and biological characteristics of waters and wastewaters, and fundamental principles of water and wastewater treatment including hands-on laboratory exercises.

**CE 351. Introductory Soil Mechanics. 4 Hours.**

PR: WVU sections require MAE 241 and MAE 243 and MATH 261 with a minimum grade of C- in each, WVUIT sections require MAE 243 and GEOL 312. Introduction to geotechnical engineering, fundamental soil properties, classification of soils, soil compaction, permeability, compressibility, and consolidation of soils, shear strength, lateral earth pressures.

**CE 361. Structural Analysis 1. 4 Hours.**

PR: WVU sections require MAE 241 and MAE 243 and MATH 261 with a minimum grade of C- in each, WVUIT sections require MAE 243 and PR or CONC: MATH 251. Stability, determinacy, and equilibrium of structures; shear and bending moment diagrams of determinate and indeterminate beams and frames; analysis of trusses; displacement of planar structures by geometric and energy methods.

**CE 375. Geographic Information Systems (GIS) Applications in Engineering. 3 Hours.**

PR: CE 204 with a minimum grade of C-. Describes Geographic Information Systems (GIS) concepts and spatial data models and introduces the concepts of map projections and coordinate systems. Includes review of different techniques and technologies of data entry & editing, with emphasis on Global Navigation Satellite Systems. Discussion of general spatial analysis, queries and data manipulation, raster analysis & handling Metadata. Highlights use of GIS in Civil Engineering.

**CE 411. Pavement Design. 3 Hours.**

PR: WVU sections require CE 351, WVUIT sections required CE 312 and CE 331 and CE 351. Effects of traffic, soil, environment, and loads on the design and behavior of pavement. Design of pavement structures. Pavement performance and performance surveys.

**CE 421. Hydraulic Engineering. 4 Hours.**

PR: ENGR 331. Hydraulic flow in pipes: series, parallel, branched, and pipe networks, water hammer, surge tanks, pumps and turbines Basic open channel flow. Elements of storm and sanitary sewer design. Dams and reservoirs. Laboratory experiments and report writing in several areas of fluid mechanics and hydraulics.

**CE 422. Advanced Hydraulic Engineering. 3 Hours.**

PR: CE 421. Basic open channel flow concepts; energy and momentum principles in open channel flow; flow resistance; channel controls and transitions. Hydrology; physical and quantitative; rational, SCS.

**CE 425. Engineering Hydrology. 3 Hours.**

PR: WVU sections require CE 321, WVUIT sections require MAE 331. Scientific basis of the hydrologic cycle and its engineering implications; rainfall-runoff processes, hydrographs, flood routing, and statistical methods. (3 hr. lec.).

**CE 431. Highway Engineering. 3 Hours.**

PR: WVU sections require CE 332, WVUIT sections require CE 204 and CE 331. Highway administration, economics and finance; planning and design; subgrade soils and drainage; construction and maintenance. Design of a highway. Center line and grade line projections, earthwork and cost estimates.

**CE 432. Traffic Engineering. 3 Hours.**

PR: CE 332. Traffic engineering concepts and parameters, traffic data collection and analysis methods, theory and design of traffic control systems, traffic safety and operations analysis.

**CE 444. Advanced Sanitary Engineering. 3 Hours.**

PR:CE 347. Contemporary practices in sewage disposal and advance waste treatment. Design of sedimentation units, biological treatment units, disinfection and advanced water treatment units.

**CE 446. Solid Waste Management. 3 Hours.**

PR:CHEM 116 and CE 351 History of solid waste management. Laws and regulations pertaining to solid waste management. Sources, composition, and properties and municipal solid waste. Handling, collection, separation, transformation, transport, and disposal of solid waste including landfill design. Incineration, landfill closure, and recycling.

**CE 451. Foundation Engineering. 3 Hours.**

PR: CE 351. Subsurface investigations and synthesis of soil parameters for geotechnical design and analysis, concepts of shallow and deep foundation design, geotechnical design of conventional retaining walls, computerized analysis and design of soil/foundation interaction; case histories. (3 hr. lec.).

**CE 452. Groundwater and Seepage. 3 Hours.**

PR:CE 351. Fundamentals of groundwater flow; permeability; seepage principles; flownet interpretation; analytical and numerical solutions of confined and unconfined flows; filter design; geofabrics; subsurface drainage; groundwater contamination; disposal systems.

**CE 453. Earthwork Design. 3 Hours.**

PR: CE 351. Use of soil mechanics principles in the analysis, design and construction of earth structures. Principles of compaction and compaction control; an introduction to slope stability analysis and landslides; earth reinforcement systems, and ground improvement techniques. (3 hr. lec.).

**CE 461. Structural Analysis 2. 3 Hours.**

PR: WVU sections require CE 361, WVUIT sections require MATH 261 and PR or CONC: (CE 462 or CE 463). Fundamental theory of statically indeterminate structures; analysis of indeterminate beams, frames, and trusses by stiffness and flexibility methods; study of influence lines for beams, frames, and trusses.

**CE 462. Reinforced Concrete Design. 3 Hours.**

PR: WVU sections require CE 361, WVUIT sections require PR or CONC: CE 361. Behavior and design of reinforced concrete members. Material properties, design methods and safety consideration, flexure, shear, bond and anchorage, combined flexure and axial load, footings, introduction to torsion slender columns, and pre-stressed concrete.

**CE 463. Steel Design. 3 Hours.**

PR: CE 361. Material properties, design of steel bridge and building systems with emphasis on connections, beams, columns, plastic design, and cost estimates.

**CE 464. Timber Design. 3 Hours.**

PR: CE 361. Fundamentals of modern timber design and analysis. Topics include wood properties, design of beams, columns, trusses, and other structures using dimension lumber, glue-laminated products and composites.

**CE 479. Integrated Civil Engineering Design-Capstone. 3 Hours.**

PR: Senior standing and a minimum grade of C- in CE 411 or CE 415 or CE 431 or CE 439 or CE 447 or CE 451 or CE 453 or CE 462 or CE 463 or CE 464 or CE 465. Capstone integration of the civil engineering curriculum by comprehensive design experience to professional standards. Projects are performed in student groups under faculty supervision.

**CE 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

**CE 497. Research. 1-15 Hours.**

Independent research projects.

**COMMUNICATION STUDIES****COMM 100. Principles of Human Communication. 1 Hour.**

Introduction to the human communication process with emphasis on the principles, variables, and social contexts of communication.

**COMM 102. Fundamentals of Interpersonal Communication. 3 Hours.**

Emphasizes identification, definition, and application of the appropriate and effective interpersonal communication behaviors and skills needed for the development, maintenance, and termination of relationships with romantic partners, friends, family members, group members, superiors, and coworkers.

**COMM 250. Speech Communication. 3 Hours.****COMM 471. Oral Interpretation. 3 Hours.**

PR:SPA 270 or Consent. Oral performance, interpretation of prose, poetry, and drama for aiding prospective teachers in oral communication and literature.

## COMPUTER ENGINEERING

### **CPE 271. Introduction to Digital Logic Design. 3 Hours.**

PR: MATH 156 or consent. Introduction to the design of digital systems. Topics include number systems, coding, Boolean and switching algebra, minimization of logic, analysis and design of combinational and sequential logic circuits.

### **CPE 272. Digital Logic Laboratory. 1 Hour.**

CoReq: CPE 271. Experiments with digital electronic circuits including number systems, design and application of modern digital circuitry for both combinational and sequential logic circuits. (3 hr. lab.).

### **CPE 320. Microprocessor Systems. 3 Hours.**

PR: CPE 271. Introduction to microcomputer systems with emphasis on the use of a microcontroller as a digital design element. Topics include basic computer architecture, binary number systems and codes, binary arithmetic and logic operations, parallel and serial I/O, A/D conversion, timers and counters, and interrupts. Student required to develop assembly language and C-language software for interfacing to various peripherals. Microcontroller used to present case studies on several data collection and control examples.

### **CPE 321. Microprocessor Systems Laboratory. 3 Hours.**

PR or CONC: CPE 320. Machine language, assembly language and hardware and software interfacing. (This includes editing, linking, and debugging.) Memory, I/O and basic techniques of microprocessor interfacing.

### **CPE 421. Embedded Systems. 4 Hours.**

PR: CPE 320 and CPR 321. Advanced family of processors (16, 32, 64 bit) studied in depth. Design and implementation of small embedded controllers. Register level programming with assembler language and C programs that reside and execute on the microcomputer. Use peripherals including serial I/O, parallel I/O, timers and interrupts. Design of basic interface circuitry and for the microcomputer. Design of small embedded systems around microcontrollers.

### **CPE 442. Introduction to Digital Computer Architecture. 3 Hours.**

PR: (MATH 375 or MATH 378) and (CPE 310 or CPE 320). Control, data, and demand-driven computer architecture; parallel processing, pipelining, and vector processing; structures and algorithms for array processors, systolic architectures, design of architectures. (3 hr. lec.).

### **CPE 450. Introduction to Microelectronics Circuits. 3 Hours.**

PR: EE 251. (VLSI-Very Large Scale Integrated) circuit design, including layout, simulation and performance optimization of basic digital logic functions and combinations of such basic functions into more complex digital system functions. CAD tools are used for projects. (3 hr. lec.).

### **CPE 455. VLSI Design. 3 Hours.**

Physics of MOS devices, basic fabrication processes, basic logical elements, and logic design methods in NMOS and CMOS. Design rules and computation of circuit parameters from layout. Delay and power computation using a simple model. Design principles of memory circuits.

### **CPE 456. VHDL Design. 3 Hours.**

Design of digital systems using Verilog/VHDL with Xilinx software and hardware (FPGA board). Students design digital systems at a high level, express the algorithms in Verilog/VHDL and use the Xilinx platform for simulation and debugging.

### **CPE 462. Wireless Networking. 3 Hours.**

PR: EE 327 and (STAT 215 or MATH 448). Design and analysis of modern wireless data networks. Digital modulation techniques, wireless channel models, design of cellular networks, spread spectrum, carrier sense multiple access, ad-hoc networks routing, error control coding, automatic request strategies.

## COMPUTER SCIENCE

### **CS 100. Computer Science. 1 Hour.**

An introduction to and study of a programming language (such as Python), including elementary programming techniques with an emphasis on structured programming and engineering applications. Students are expected to have access to their own personal computer and internet access. Language compilers and associated software will be provided. A course programming project will be required.

### **CS 101. Intro to Computer Applications. 4 Hours.**

Introduction to spreadsheets and databases for problem-solving in disciplines such as math, science, engineering, business, social sciences, behavioral sciences, and environment: using computer applications to create technical reports and presentations.

### **CS 112. Computer Science - Engineers 1. 3 Hours.**

PR: MATH 126 and PR or CONC: MATH 128. An introduction to and study of a high level programming language, including elementary programming techniques with an emphasis on structured programming and engineering applications. Laboratory use of micro computers will be required.

### **CS 121. Computer Science 1. 4 Hours.**

PR or CONC: MATH 123 or MATH 126. Introduction to computer science, problem solving techniques, and algorithmic processes, software design, structured programming, object oriented design and programming.

### **CS 122. Computer Science 2. 4 Hours.**

PR: CS 121 with a grade of C or better. Software development with abstract data types; elementary data structures including lists, stacks, and queues; development of algorithms; classical sorting and search techniques; design methodology; file processing; recursion; and object-oriented design and development.

**CS 201. Data Structures. 3 Hours.**

PR: CS 122 and CS 121 with a minimum grade of C-. Introduction to data structures with topics to include search and sort techniques, strings, arrays, stacks, trees, and list techniques. Selected examples will be implemented in a high level language such as Pascal.

**CS 220. Discrete Mathematics. 3 Hours.**

PR: (CS 110 with a minimum grade of C- or CS 122) and (MATH 154 or MATH 155). Mathematical concepts used in computer science such as sets, relations, functions, counting principles, graphs, trees, and automata; introduction to basic graph algorithms and applications. (3 hr. lec.).

**CS 222. Intro Software Engineering. 3 Hours.**

PR: CS 122 with a grade of C or better. Principles of software engineering such as modifiability, efficiency, reliability, and understandability. Techniques include information hiding, data abstraction and modularity. Laboratory work is required.

**CS 231. Introduction to Computer Organization. 3 Hours.**

PR: CS 122. Components of a computer system; number systems, arithmetic operators, and codes; logic design principles and digital devices; micro-operations and instruction sequencing; central processing unit - control unit, registers, ALU; I/O processing; interrupts; memory; micro-programming; pipe-lined and parallel computers.

**CS 251. Operations Workshop 1. 1 Hour.**

PR: Sophomore standing or Consent. An introduction to network processing equipment familiarization with network software/hardware. Introduction to the basics of a small local area network (LAN) and the basic fundamentals of systems administration for a small network. CS 251, CS 252 and CS 253 must be taken in consecutive semesters (excluding summer terms) with the exception of co-op students.

**CS 252. Operations Workshop 2. 1 Hour.**

PR: CS 251. Continuation of CS 251.

**CS 261. ASCS Projects. 3 Hours.**

PR: CS 322 and CS 324 (for AS degree students only - Capstone design course) The design, develop and implementation of a programming project related to some area of Computer Science (hardware or software). Requirements include written reports and oral presentations and a final working software project. The study of computing ethics, and environmental issues will be covered as student presentations.

**CS 264. Data Base Management. 3 Hours.**

PR: CS 221. A study of fundamentals of data base models. The primary emphasis will be the relational database model. Data base query language will be examined. The students will receive hands-on experience with a relational data base using the query language SQL.

**CS 265. C Programming. 2 Hours.**

PR: CS 121 with a grade of C or better. Functions, parameter passing, dynamic memory allocation, pointers, and elementary data structures in C; software design and implementation with emphasis on creating and modifying large programs in procedural paradigm.

**CS 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**CS 310. Principles of Programming Languages. 3 Hours.**

PR: CS 111 with a minimum grade of C- or CS 201. Theoretical and practical aspects of languages including internal representations, run-time environments, run-time storage management; historical, current, special purpose and experimental languages; finite-state automata, regular expressions and context-free grammars, language translation, semantics and paradigms. (3 hr. lec.).

**CS 320. Analysis of Algorithms. 3 Hours.**

PR: WVU sections require CS 111 and CS 220 and MATH 156 with a minimum grade of C- in each, WVUIT sections require CS 201 and CS 220 and MATH 156 with a minimum grade of C- in each. Introduction to algorithm design and analysis. Growth rate of functions and asymptotic notation. Divide-and-conquer algorithms and recurrences; searching and sorting; graph algorithms including graph searching, minimum spanning trees, and shortest paths.

**CS 321. Introduction to Networking. 3 Hours.**

PR: CS 122. Concepts of networking with the emphasis on TCP/IP layered model of networking. Students will learn IP routing, TCP, UDP delivery of packets to client applications and write client server applications using various protocols.

**CS 322. System Analysis and Design Methodology. 3 Hours.**

PR: CS 221 and CS 222. Introduction to systems analysis techniques. Analyzing the requirements and methods employed from the initial study through implementation; physical design of the system; evaluation of optimum techniques for maximum system independence.

**CS 324. Database Management. 3 Hours.**

PR: CS 221. A study of fundamentals of data base models. The primary emphasis will be the relational database model. Data base query languages will be examined. The students will receive hands-on experience with a relational data base using the query language SQL.

**CS 355. Computer Concepts. 3 Hours.**

PR: CS 231 and CS 265. System software organization; operating system concepts including processes, threads, memory management, and the user interface; elementary network concepts.

**CS 365. Computer Languages. 1 Hour.**

PR: CS 221. A accelerated study of a programming language (such as C/C++, C#, JAVA, Visual Basic, Perl, ASP, HTML, Delphi, Ada, etc.) for students who have met the core curriculum courses in computer science.

**CS 370. Microcontrollers. 1 Hour.**

PR: CS 111 or CS 121 or consent. An introduction to microcontrollers. The use of development board and language, simple I/O, motor control (AC, DC and servos), some sensors, and microcontroller to PC communications will be covered. A project will be required of each student.

**CS 410. Compiler Construction. 3 Hours.**

PR: WVU sections require CS 310 with a C- or better or consent for non-majors, WVUIT sections require CS 310 or consent for non-majors. Theory and practice of the construction of programming language translators; scanning and parsing techniques, semantic processing, runtime storage organization, and code generation; design and implementation of interpreter or compiler by students. (3 hr. lec.).

**CS 422. Automata Theory. 3 Hours.**

PR: WVU sections require CS 220 with a minimum of C- or better or consent for non-majors, WVUIT sections require CS 220 or consent for non-majors. Introduction to formal languages, grammars, and automata; regular expressions and finite automata, context-free and context-sensitive languages; push down and linear-bounded automata; turning machines and recursively enumerable languages.

**CS 450. Operating Systems Structure. 4 Hours.**

PR: CS 350 with a minimum grade of C- or CS 355. Support of computer components; device management and interrupts, process scheduling, file management, complete OS structure, OS development and debugging, configuration management, and performance testing. (3 hr. lec., 1 hr. lab.).

**CS 453. Data and Computer Communications. 3 Hours.**

PR: (CS 350 with a C- or better or CS 355) or consent for non-majors. An in-depth study of the Internet, networking fundamentals, protocols, algorithms, and principles of distributed computing, introduction to network security and management.

**CS 454. Cryptology. 3 Hours.**

PR: MATH 441. This course is designed to give students in a basic introduction, the foundation, and developments in the field of cryptology. Mono-alphabetic substitutions, poly-alphabetic substitutions stream ciphers, block ciphers, public key cryptology, and quantum ciphers will be reviewed along with number theory and probability necessary for solving encryptions.

**CS 455. Computer Architecture. 3 Hours.**

PR: CPE 271. Computer structure; emphasis on implications for software design; evolution of computers; elementary digital logic; CPU structures; memory and I/O structures; pipelining and memory management; introduction to parallel and high-level architectures. (3 hr. lec.).

**CS 456. Digital Image Processing. 3 Hours.**

PR: MATH 156 and CS 201. This course covers techniques for image acquisition, transformation, enhancement, restoration, compression, segmentation, and recognition. A brief introduction to advanced topics such as motion detection, optical flow will also be included.

**CS 461. Senior Project. 3 Hours.**

PR: CS 322 and CS 324. The design, development and implementation of a project related to some area of computer science (hardware or software). Requirements include written reports and oral presentations. The study of computing ethics, and environmental issues will be covered as student presentations.

**CS 465. Cybersecurity Principles and Practice. 3 Hours.**

PR: WVU and PSC sections require CS 350 with a minimum grade of C- and WVUIT sections require CS 321. Covers the principles and practice of cybersecurity. Addresses encryption; malicious code, spyware, and spam; authentication and access control; database security; operating system security; network security; and social engineering. Provides comprehensive overview of the cybersecurity threats, technologies for information assurance, and engineering approaches to build and maintain secure cyber space.

**CS 470. Introduction to Computer Graphics. 3 Hours.**

PR: CS 201 or CS 210 with a minimum grade of C- or consent for non-majors. Overview of 3D graphics hardware and gaming consoles; focus on developing 3D graphics software; fundamental algorithms for real-time 3D graphics with focus on game engine component development; introduction to three-dimensional game engine development.

**CS 472. Artificial Intelligence. 3 Hours.**

PR: CS 222 or CS 230 with a minimum grade of C- or consent for non-majors. Survey of AI techniques, heuristic search, game playing, and knowledge representation schemes: logic, semantic net, frames, rule-based; natural language processing, advanced AI techniques/systems: planning, blackboard architecture, neural net model; AI implementation. (3 hr. lec.).

**CS 475. Game Development. 3 Hours.**

PR: CS 222 or (CS 220 and CS 310 with a minimum grade of C- in each). Design and implementation of games using innovative technology in human-computer interfaces. Principles of game design, physiology and psychology of each of the five senses, and technologies for delivering sensory stimuli.

**CS 479. Advanced Computer Science Mathematics. 3 Hours.**

PR: MATH 441 and MATH 448. Topics include applied numerical methods, statistical computing techniques, data smoothing and filtering. Emphasis will be placed on design and implementation. Students will utilize software packages such as SAS, MatLab, or MathCad.

**CS 480. Capstone Project - Design. 2 Hours.**

PR: ENGL 102 or ENGL 103 and consent. Penultimate semester. Group senior design projects with individual design assignments appropriate to student's discipline. Complete system-level designs of the subsequent semester's project presented in written proposals and oral presentations. (Equivalent to BIOM 480, CPE 480, and EE 480.) (2 hr. lec., 1 hr. conf.).

**CS 481. Capstone Project - Implementation. 3 Hours.**

PR: CS 480. Continuation of CS 480. Detailed design and implementation of the system including choice of components, algorithm development, interfacing, troubleshooting, working in groups, and project management. Also covers professional topics, including ethics, liability, safety, socio-legal issues, risks and employment agreements. (1 hr. lec., 1 hr. conf., 2 hr. lab.).

**CS 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**CS 497. Research. 1-6 Hours.**

Independent research projects.

**COMPUTERIZED DRAFTING AND DESIGN ENGINEERING TECHNOLOGY****DRET 120. Drafting 1. 2 Hours.**

Fundamentals of drafting through the use of sketching and computer graphics as applied to orthographic views, sectional views, isometric views, and threads and fasteners. Also the student will be introduced to computer graphics early in the program and will be required to produce much of their work using CAD.

**DRET 121. Drafting 2. 2 Hours.**

Teaches basic mechanical drafting techniques covering auxiliary views, working drawings, and tolerancing; basic descriptive geometry; and mapping. More in-depth coverage of computer graphics.

**DRET 201. Electrical and Electronic Drafting. 2 Hours.**

PR: DRET 120. Block diagrams, control drawings, logic diagrams, schematic diagrams, printed circuit board drawings, integrated circuit drawings, ladder diagrams, and interconnecting diagrams using CAD. Current techniques to produce electrical design and working drawings will also be studied.

**DRET 202. Architectural Drafting. 3 Hours.**

PR: DRET 121 or consent. Functional planning and design of residences and allied structures; experience in designing, drawing, calculation costs, and preparing and presentation drawings.

**DRET 204. Structural Drafting. 3 Hours.**

PR: DRET 121. Co-Req: CIET 115. Techniques in preparing design and working drawings for various structures in wood, concrete, and steel. CAD used extensively.

**DRET 212. Piping and Sheet Metal Drafting. 3 Hours.**

PR: DRET 121. Design, layout and graphical treatment of piping systems. Emphasis on standard symbols and nomenclature and schematic, pictorial, multiview representation. Design and layout of patterns for fabrication from sheet materials. Emphasis on theory or developments, sheet materials, forming processes, and use of standard forming tables.

**DRET 216. Engineering Design Graphics. 3 Hours.**

PR: DRET 121 and MEET 121 and MATH 113 and DRET 202 and MEET 225 or consent. The design process, problem identification, refinement, and analysis using both computer (CAD) and mechanical drafting. Implementation skills to include multiview sketching and drawing, auxiliary views, working and pictorial drawings, sections, dimensioning, tolerances; screws and fasteners, gears and cams. Design projects will be assigned throughout and oral presentation will be required.

**DRET 314. Computer Graphics. 3 Hours.**

PR: DRET 120 or consent (for non-majors) Teaches use of the two dimensional graphics capability of the microcomputer, using the AutoCAD industrial software package. Also covers printer and plotter capabilities and provides an introduction to 3D computer graphics.

**DRET 315. Advanced Computer-Aided Drafting. 3 Hours.**

(For non-drafting Majors) Course continues the development of skills in the use of computer graphics. It further develops skills by exposing students to more powerful software and equipment. Concentrates on AutoCAD's 3D and solid modeling applications to include wire frame modeling, surface modeling, region modeling, primitives and Boolean operation.

**DRET 384. Microstation. 3 Hours.**

PR: DRET 314 or consent. This course will introduce the student to the basic operation of MicroStation CAD software. Some comparisons to AutoCAD will be made. Included in this course are loading existing design files; new design file creation and setup; construction and modification within design files; cell library concepts; dimensioning; and plotting.

**DRET 385. Land and Topographic Design. 3 Hours.**

PR: DRET 314. Introduction to various topographic-related drawings and design principles utilizing specialized design software intended for this purpose. Emphasis is placed on conventions and practices that are used by CAD professionals working in civil, surveying, and mapping fields.

**DRET 386. Parametric Modeling. 3 Hours.**

PR: DRET 314. The creation of three-dimensional parametric models that are used to develop solutions to design problems. Specialized design software is used to create designs and perform various analytical functions on them. Creation of engineering drawings from parametric models; assembly of components to make adaptive assemblies; and generation of presentation files for technical illustrations are studied.

**DRET 387. Illustrations for Presentations. 3 Hours.**

PR: DRET 314. The creation of drawings and design solutions to be used on a presentation level. Design software is used to not only create camera-ready presentation drawings, but also explore the use of animation technology to better present design solutions.

**DRET 393. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

## **CONSTRUCTION MANAGEMENT**

**CMGT 101. Introduction to Construction Management. 3 Hours.**

Introduction to construction management including industry divisions and sectors, stakeholders, organization structures, project delivery methods, and contracting. Overview of the roles of management and the trades, resources, safety, environmental issues, ethics, and codes, standards, and regulations.

**CMGT 110. Computer Applications for Construction. 4 Hours.**

Utilization of spreadsheets, charts and tables for problem-solving and creating reports and presentations required for construction management. Overview of information technology in construction including software and hardware.

**CMGT 120. Analytical Techniques for Construction. 3 Hours.**

Qualitative and quantitative methods for problem solving and decision making for construction professionals. Quantitative techniques include time value of money concepts, benefit-cost analysis, break-even analysis, discounted payback, and the application of decision trees applied to problems typically encountered in construction management. Qualitative analysis tools include ranking, root cause analysis techniques such as the 5 Whys and A3 problem solving.

**CMGT 150. Construction Graphics. 3 Hours.**

Basics of reading and interpreting construction drawings. Includes graphics and symbols for site work, foundations, framing, interior and exterior finishes, and electrical and mechanical systems. Manual sketching and use of CAD to prepare details of building and site details, and introduction to 3D modeling and BIM.

**CMGT 210. Statics & Strength of Materials. 3 Hours.**

PR: PHYS 101. Introduction to statics and mechanics of materials for constructors. Topics include forces, static equilibrium, the concepts of stress and strain, elastic deformation, and mechanical properties of materials. Graphical techniques include free body diagrams along with moment and shear diagrams.

**CMGT 220. Construction Methods & Materials 1. 3 Hours.**

PR: CMGT 210 with a minimum grade of C-. Introduction to building materials including wood and timber, earth products, concrete, and masonry. Topics include lumber and engineered wood products, fasteners, aggregates, concrete production, cast-in-place and precast concrete, concrete block, brick, and stone masonry. Mechanical and non-mechanical properties, production, and installation of these materials are discussed with consideration of safety, sustainability, and quality.

**CMGT 225. Construction Methods & Materials 2. 3 Hours.**

PR: CMGT 220 with a minimum grade of C-. Content covers steel and nonferrous metals, glass, polymers and roofing and waterproofing materials. Topics include steel framing, cladding, curtain wall construction, roofing systems, and architectural finishes. Mechanical and non-mechanical properties, production, and installation of these materials are discussed with consideration of safety, sustainability, and quality.

**CMGT 230. Construction Survey & Layout. 3 Hours.**

PR: MATH 128. Basics of land surveying and layout for building and infrastructure construction. Topics include distance and angular measurement, leveling, total station, GPS field procedures, and robotics. The traverse, layout techniques, and construction control are addressed including an introduction to horizontal and vertical curves. The course opens with a brief view of basic trigonometry and coordinate geometry.

**CMGT 240. Soils & Foundations for Constructors. 3 Hours.**

PR: CMGT 210 with a minimum grade of C-. Overview for construction practitioners that begins with basic soil classifications and behavior, through soil mechanics, and ultimately foundations. Topics include soil exploration, compaction and consolidation, stabilization, water flow, subsurface stresses and shear strength of soil, and shallow and deep foundations. Lateral earth pressure and retaining structures will also be discussed.

**CMGT 250. Structural Systems. 3 Hours.**

PR: CMGT 210 with a minimum grade of C-. Overview of structural systems for constructors. Topics include determining load paths in structural systems and the analysis and design of wood, steel, and concrete components. These includes beams, columns, and trusses.

**CMGT 320. Mechanical Building Systems. 3 Hours.**

PR: PHYS 101. Fundamentals of mechanical systems design and installation for buildings. Topics include heating, ventilating, and air conditioning (HVAC); drain, waste, vent (DWV) systems; water supply, fire protection, and stormwater management. The course opens with a brief review of heat transfer and fluid flow. Life-cycle costs, energy efficiency, and sustainability are reoccurring themes throughout the course.

**CMGT 330. Electrical Building Systems. 3 Hours.**

PR: PHYS 102. Fundamentals of electrical and lighting system design and installation for buildings. Topics include generation, transmission, and distribution of electricity; building power requirements, electrical circuits and wiring, conduit, appliances and devices, direct and indirect lighting, and controls. The course begins with a brief review of the basics of electricity and light and concludes with a discussion of commissioning of building systems.

**CMGT 340. Construction Planning & Scheduling. 3 Hours.**

PR: CMGT 101 and CMGT 150 and CMGT 225 with a minimum grade of C- in each. Content covers construction planning, scheduling, network systems, and communications required for project execution and control. It includes designing construction activities, logic diagramming, computing durations, and identifying resource requirements. Scheduling techniques presented are Critical Path Method (CPM), Location-Based Management System (LBMS), and Last Planner System (LPS). Brief introduction of commercially available scheduling software.

**CMGT 350. Construction Estimating. 3 Hours.**

PR: CMGT 101 and CMGT 150 and CMGT 225 with a minimum grade of C- in each. Intended to develop knowledge and skill in the estimating process from takeoff through preparation of the final bid. Introduction to conceptual estimating, developing unit prices; markups for overhead, contingency, and profit; and ethical practice. Includes a brief introduction to commercially available estimating software.

**CMGT 360. Construction Law & Contract Administration. 3 Hours.**

PR: Junior or senior status. Construction law topics covering contracts, torts, and statutory law. Topics include contract documents and specifications, liability, claims, and liens. Ethical practice and risk management are underlying and reoccurring themes.

**CMGT 370. Construction Safety & Production Systems. 3 Hours.**

PR: CMGT 150 and CMGT 225 with a minimum grade of C- in each. Concurrent design of safety and production systems. Topics include design of safe, effective, and reliable construction processes; integration of prefabricated and precast elements, safe ingress, egress, and access to the workface, and stable workflow. Reoccurring themes include continuous improvement, respect for people, elimination of waste, reducing variability and increasing plan reliability.

**CMGT 380. Residential Construction Practice. 3 Hours.**

PR: CMGT 225 with a minimum grade of C-. Studio course applying construction management knowledge and tools to developing and constructing single and multifamily projects. Project life cycle includes conceptualization and feasibility, preconstruction service, construction, and closeout. Introduction and application of the Value Management framework. The course culminates with a report and presentation.

**CMGT 410. Construction Finance & Cost Control. 3 Hours.**

PR: CMGT 120 and CMGT 350 with a minimum grade of C- in each. Overview of financial and accounting practices applied to construction projects and company management. Topics include financing construction projects, cash flow, budgeting, capturing and analyzing cost data, and time value of money in decision making. Ethical practice is an underlying and reoccurring theme.

**CMGT 420. Management of Construction Operations. 3 Hours.**

PR: Senior status. Addresses the execution and control of construction operations in the field and office. Topics include procurement, production control, site logistics, communication and stakeholder management, change management, tracking progress, and project closeout. Safety, quality, reliability, and ethical practice are reoccurring themes.

**CMGT 430. Commercial Construction Practice. 3 Hours.**

PR: CMGT 350 and CMGT 360 and CMGT 370 and CMGT 380 with a minimum grade of C- in each. Studio course applying construction management knowledge and tools to developing and constructing commercial or institutional building projects. Project life cycle includes conceptualization and feasibility, preconstruction service, construction, and closeout. Application of the Value Management framework. The course culminates with a report and presentation.

**CMGT 440. Heavy Construction Practice. 3 Hours.**

PR: CMGT 350 and CMGT 360 and CMGT 370 and CMGT 380 with a minimum grade of C- in each. Studio course applying construction management knowledge and tools for constructing heavy infrastructure projects. Project life cycle includes preconstruction, construction, and closeout. The course introduces bridges, pavements, utilities, and heavy equipment applications. The course culminates with a report and presentation.

**CMGT 450. Industrial Construction Practice. 3 Hours.**

PR: CMGT 350 and CMGT 360 and CMGT 370 and CMGT 380 with a minimum grade of C- in each. Studio course applying construction management knowledge and tools for constructing industrial projects. Such projects include power plants, manufacturing facilities, and petrochemical plants. Project life cycle includes preconstruction, construction, and startup. The course introduces heavy vessel and equipment installation, process piping, and controls for electromechanical systems. The course culminates with a report and presentation.

**CMGT 460. Management of the Construction Firm. 3 Hours.**

PR: CMGT 360 with a minimum grade of C-. Application of management principles to construction firm operations. Topics include strategic planning and management techniques for long-term planning and management of the firm. Ethical practice and risk management are underlying and reoccurring themes.

**CMGT 465. BIM in Construction Management. 3 Hours.**

PR: Senior status. Application of building information modeling software to model building and infrastructure systems and construction processes. Computerized BIM applications include integration of prevailing commercially available software.

**CMGT 466. Marketing Construction Services. 3 Hours.**

PR: CMGT 350 with a minimum grade of C-. Application of marketing principles to the construction industry. Topics include market research, developing marketing strategy, and business development techniques.

**CMGT 467. Facilities Management. 3 Hours.**

PR: CMGT 320 and CMGT 330 with a minimum grade of C- in each. Integration of business administration principles with building systems operations. Topics include facilities planning, budgeting, real estate transactions, construction, emergency preparedness, security, operations, and maintenance.

**CMGT 468. Temporary Structures. 3 Hours.**

PR: CMGT 240 and CMGT 250 with a minimum grade of C-. Analysis, design and installation of temporary structures required to facilitate construction flow. These include scaffolding, concrete formwork, falsework, and support of excavation.

## **COOPERATIVE EDUCATION**

**COOP 101. Humanities Internship 1. 0 Hours.**

Student enrolls for course to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 102. Humanities Internship 2. 0 Hours.**

Student enrolls for course to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 103. Engineering Internship 1. 0 Hours.**

Student enrolls for courses to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 104. Engineering Internship 2. 0 Hours.**

Student enrolls for course to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 105. Engineering Technology Internship 1. 0 Hours.**

Student enrolls for course to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 106. Engineering Technology Internship 2. 0 Hours.**

Student enrolls for course to designate a supervised one or two term commitment to an off-campus work assignment in business or industry.

**COOP 205. Cooperative Work Experience 1. 0 Hours.**

Student enrolls for course to designate a supervised three to five term commitment to an off-campus assignment in business or industry.

**COOP 206. Cooperative Work Experience 2. 0 Hours.**

Student enrolls for course to designate a supervised three to five term commitment to an off-campus assignment in business or industry.

**COOP 207. Cooperative Work Experience 3. 0 Hours.**

Student enrolls form course to designate a supervised three to five term commitment to an off-campus assignment in business or industry.

**COOP 208. Cooperative Work Experience 4. 0 Hours.**

Student enrolls for course to designate a supervised three to five term commitment to an off-campus assignment in business or industry.

**COOP 209. Cooperative Work Experience 5. 0 Hours.**

Student enrolls for course to designate a supervised three to five term commitment to an off-campus assignment in business or industry.

## **CRIMINAL JUSTICE**

**CJ 101. Introduction to Criminal Justice. 3 Hours.**

This course examines the history, structure, functions and issues related to criminal law, law enforcement, criminal adjudication, and corrections. The course also examines criminological theories and research, and the juvenile justice system. (Equivalent to SOCA 234).

**CJ 202. Principles of Criminal Law. 3 Hours.**

This course focuses on the history, scope, purpose, and definition of the criminal law. Topics include crimes against person, crimes against property, other offenses, interpretation of statutes, legal definitions of specific criminal offenses, rights of the accused, pre-trial procedures, the criminal trial, sentencing, and the appeal process.

**CJ 233. Juvenile Justice. 3 Hours.**

PR: CJ 101 or SOCA 234. The history, philosophy, and processes of the juvenile justice system are studied. The juvenile court's jurisdiction over juvenile delinquency, status offenses, and abuse and neglect is examined. Topics include juvenile rights, types of juvenile correctional institutions and community based correctional alternatives for juveniles.

**CJ 240. Correctional Counseling. 3 Hours.**

A survey of contemporary counseling interventions for juvenile and adult offenders with an emphasis on cognitive and behavior modifications strategies. Other counseling models will also be examined.

**CJ 245. Adjudication Process. 3 Hours.**

PR: CJ 101. Role and structure of prosecution, public defense, and the courts; basic elements of the substantive criminal law; procedural law and its relation to constitutional guarantees.

**CJ 301. White Collar and Economic Crime. 3 Hours.**

PR: CJ 101. Overview of white collar and economic crime in America including an examination of the extent of economic crime, law enforcement effectiveness, theories of causation, and methods of prevention. Also discussing the effect of the Internet on white collar and economic crime.

**CJ 310. Law Enforcement Administration. 3 Hours.**

This course introduces the history of law enforcement in the United States, the roles of law enforcement officers, the purpose of policing, police conduct, police administration, and community relations.

**CJ 316. Community Based Corrections. 3 Hours.**

The history, philosophy, types and current trends in community based corrections is studied. Specifically, probation, parole, diversion programs, and intermediate sanctions including house arrest, community service, restitution, halfway houses, and temporary release are examined.

**CJ 320. Courts and Judicial Systems. 3 Hours.**

This course focuses on the structure and philosophy of the court system with special emphasis on court procedures, constitutional guarantees, the trial process, the role of judges, prosecutors, defense attorneys and juries.

**CJ 324. Drugs, Crime and Society. 3 Hours.**

PR: SOCA 101 and (CJ 101 or SOCA 234). Examines the fundamentals of mood-altering chemicals and their effects on the individual, the criminal justice system, and society. Addresses the current US policy regarding substance abuse, investigation, prevention, treatment, criminality, and education.

**CJ 393. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**CJ 401. Research Methods in Criminal Justice. 3 Hours.**

PR: STAT 111 or STAT 211. A general introduction to the process of research emphasizing research design, techniques of data collection including electronic methods, analysis and interpretation of research results as applied to the study of criminal justice.

**CJ 410. Criminal Investigations. 3 Hours.**

This course focuses on that aspect of the American legal and judicial system associated with the investigative processes as conducted by law enforcement and forensic science. Included will be an examination of the role of crime scene investigation, witness interviewing, and the investigators relationship with the prosecution.

**CJ 475. Seminar in Criminal Justice-Capstone. 3 Hours.**

This capstone course integrates the knowledge and skills the students have acquired during all of their major course work All students must be Criminal Justice Seniors in good standing and have permission of the instructor. Instruction will be in the classroom with two field trips outside the classroom setting.

**CJ 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

## CULINARY

**CULN 101. Safety and Sanitation. 3 Hours.**

Sanitation and food safety practices, which are regulated by the US Food and Drug Administration and the WV Department of Health and Human Resources, food-borne illness and microorganisms, safe temperatures, health codes, and worker protection.

**CULN 102. Culinary Computations. 3 Hours.**

Percentages, costing, ratios, conversion factors, yield tests, and the metric system as they relate to food. Calculation of menu item selling prices, labor, payroll tax, tip credit, and other employee-related taxes. The overall concept of purchasing and receiving practices in quality food services operations. Regulations for the inspection, grading, and receipt of foods.

**CULN 105. Baking Theory and Lab. 3 Hours.**

PR: CULN 101 and CULN 102. Introduction to a variety of ingredients used in the baking environment. The individual components, processing, and interactions between components are discussed in relation to use in baked products. Students participate in exercises and experiments that relate to the science of baking and show the differences in baking products, ingredients, and methods of preparation.

**CULN 210. Culinary Skills 1. 3 Hours.**

PR: CULN 101 and CULN 102. Basic culinary skills and knowledge of food and kitchen safety; knife skills; sanitation practices; equipment identification; and a survey of raw ingredients including fruit, vegetables, starches, herbs, spices and dairy products.

## ECONOMICS

**ECON 201. Principles of Microeconomics. 3 Hours.**

Introductory microeconomics analysis. Competitive behavior of firms, price determination, efficiency in production and equity in distribution. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**ECON 202. Principles of Macroeconomics. 3 Hours.**

PR: ECON 201 or ARE 150. Introductory macroeconomics analysis, prerequisites are not enforced at WVUIT and Potomac State campuses. Aggregate demand and supply, saving, investment, the level of employment and national income determination, monetary and fiscal policy.

**ECON 225. Elementary Business and Economics Statistics. 3 Hours.**

PR: MATH 122 or MATH 123 or MATH 126 or MATH 129 or MATH 153 with a minimum grade of C- or MATH 150 or MATH 154 or MATH 155 or MATH 156 with a minimum grade of D-. Basic concepts of statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regression and correlation with emphasis on business and economics examples. (Not open to students who have completed STAT 215.).

**ECON 235. Public Finance. 3 Hours.**

Basic concepts of financing government; principal sources of public revenue; public expenditures; probable incidences; major tax types; intergovernmental fiscal relations; public credit.

**ECON 240. Introduction to Labor Unions. 3 Hours.**

Structure, function and activities of labor unions and labor organizations; theories of labor organizational comparative labor movements; survey of labor and industrial relations.

**ECON 250. Principles of Risk and Insurance. 3 Hours.**

Basic concepts of insurance and risk administration.

**ECON 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ECON 300. Intermediate Theory: Price/Mrkts. 3 Hours.**

**ECON 301. Intermediate Micro-Economic Theory. 3 Hours.**

PR: ARE 150 or ECON 201 with a minimum grade of C-. Consumer choice and demand; price and output determination of the firm, and resource allocation, under different market structures; welfare economics, externalities, public goods, and market failure; general equilibrium; other topics.

**ECON 306. History of Economic Thought. 3 Hours.**

PR: ECON 201 and ECON 202. Economic ideas in perspective of historic development.

**ECON 320. Economic History of the American Labor Movement. 3 Hours.**

Labor in colonial America; use of slave and immigrant manpower; economic development and its effect on labor; early beginnings and development of unions; development of industrial relations.

**ECON 331. Money and Banking. 3 Hours.**

PR: ECON 201 and ECON 202. The U.S. monetary and banking system and its functional relationship to the economic system; monetary theory and policy.

**ECON 337. Industrial Relation. 3 Hours.**

PR: ECON 202 or Consent. Economic and political aspects of labor-management relationships; workers problems; union history, organization and policy; collective bargaining and settlement of labor disputes; labor legislation.

**ECON 345. Labor Law. 3 Hours.**

Evolution of labor legislation in the U.S.; Sherman Act, Clayton Act, NIRA; Wagner Act, Taft-Hartley Act; Landrum-Griffin Act. Jurisdictional disputes; freedom of speech; solicitation of membership; voting rights of strikers; picketing; secondary boycotts; strike regulations; labor and anti-trust regulations; growing role of government in collective bargaining. Study and use of professional and reference materials.

**ECON 346. Interpreting Labor Agreements. 3 Hours.**

PR: ECON 345 or Consent. This course will focus on the language, design, and structure of contracts; the function of grievance procedure; and the understanding of contract provisions. Court and arbitration decisions will be used as case studies. Study and use of professional and reference materials.

**ECON 348. Arbitration Practices and Procedures. 3 Hours.**

PR: ECON 345 or Consent. Orientation toward practice and procedure in labor arbitration, including preparation and presentation of a labor arbitration case (role of representatives and arbitrator, evidence, remedies, opening statements and closing arguments, transcripts, post-hearing briefs, study and use of professional and reference materials): extensive reference to and use of the National Bituminous Coal Wage Agreement(s).

**ECON 350. Principles of Risk and Insurance. 3 Hours.**

Concepts of insurance and risk administration.

**ECON 360. Employee Relations Law. 3 Hours.**

Government regulation of personnel; equal employment opportunity; workers compensation; Occupational Safety and Health Act; unemployment compensation; Employee Retirement Income Security Act.

**ECON 370. Wage Theory and Administration. 3 Hours.**

PR: ECON 201 and ECON 202 and ECON 350 or Consent. Development of wage theories; wage/salary determination processes; wage structures; impact of wage differentials; wage administration; merit systems; implementation and effect of government regulations.

**ECON 401. Managerial Economics. 3 Hours.**

Cost and revenue analysis; compound interest model for profitability analysis planning working model for profitability analysis; planning working capital needs; replacement policy; inventories; working capital needs; replacement policy; inventories; linear programming; estimating demand, cost and pricing.

**ECON 430. Collective Bargaining. 3 Hours.**

PR: ECON 201 and ECON 202 or Consent. Union structure, administration and operation; basic theories of collective bargaining; the bargaining process, administration of agreements; wage and fringe issues in collective bargaining; institutional and administrative issues; case studies.

**ECON 441. Public Economics. 3 Hours.**

PR: ECON 202. Economic roles of the public sector. Particular attention to market failure, redistributing income, the financing of public sector activities, relationships between federal, state, and local governments, and public choice.

**ECON 445. Government and Business. 3 Hours.**

PR: ECON 201 and ECON 202. Examination of market structure, conduct, and performance. Analysis of market regulation including antitrust laws and regulation of monopolies.

**ECON 449. Global Economic Issues. 3 Hours.**

PR: ECON 201 and ECON 202 or consent. Analysis of the nature and problems of less developed economics and various strategies for stimulating economic development; theory of international trade, the balance of payments, international capital flows, exchange rates, and commercial policies affecting trade relations; analysis of current global economic issues.

**ECON 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ECON 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

**ECON 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ELECTRICAL ENGINEERING****EE 200. Software Tools. 2 Hours.**

Introduction to the principal software tools used by electrical and computer engineers, including Pspice and Matlab. Students will solve real-world problems using simulation tools and report their results.

**EE 221. Introduction to Electrical Engineering. 3 Hours.**

PR: WVU and PSC sections require PHYS 111 and MATH 156, WVUIT sections require MATH 156. Electrical engineering units, circuit elements, circuit laws, measurement principles, mesh and node equations, network theorems, operational amplifier circuits, energy storage elements, sinusoids and phasors, sinusoidal steady state analysis, average and RMS values, complex power. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**EE 222. Introduction to Electrical Engineering Laboratory. 1 Hour.**

CoReq: EE 221. Design and experimental exercises basic electrical circuits. Use of the digital computer to solve circuit problems. (3 hr. lab.).

**EE 223. Electrical Circuits. 3 Hours.**

PR: WVU and PSC sections require EE 221 and EE 222 and PHYS 112 and MATH 251 all with a grade of C- or better, WVUIT sections require EE 221 and EE 222 and MATH 251 all with a grade of C- or better. Time response of RC and RL circuits, unit step response, second order circuits, poly-phase systems, mutual inductance, complex frequency, network frequency response, two-port networks and transformers. Fourier methods and Laplace Transforms.

**EE 224. Electrical Circuits Laboratory. 1 Hour.**

CoReq: EE 223. Design and experimental exercises in circuits. Transient circuits, steady state AC circuits, frequency response of networks. Use of digital computer to solve circuit problems. (3 hr. lab.).

**EE 311. Junior Instrumentation Lab. 1 Hour.**

PR: CPE 271 and CPE 272. Students learn about industrial automation systems using data collection and control systems. Specific topics include PLCs (basic ladder diagrams, I/O, timers, counters, communications, and applications); measurement principles including standards, transducers, actuators, interference and noise.

**EE 327. Signals and Systems 1. 3 Hours.**

PR: MATH 261 and EE 223. Introduction to linear system models and solutions in the time and frequency domains. Balanced emphasis is placed on both continuous and discrete time and frequency methods. (3 hr. lec.).

**EE 329. Signals and Systems 2. 3 Hours.**

PR: EE 327 and (MATH 448 or PR or CONC: STAT 215). Analysis of continuous and discrete time signals. Statistical description of nondeterministic signals, correlation functions, and spectral density with these concepts applied to communications and signal processing. (3 hr. lec.).

**EE 335. Electromechanical Energy Conversion and Systems. 3 Hours.**

PR: WVU sections require EE 223 and EE 224 and PHYS 112, WVUIT sections require EE 223 and EE 224 and a co-requisite of EE 345. Electric energy sources, fundamentals of electromechanical energy conversion, transformers and rotating machinery.

**EE 336. Electromechanical Energy Conversion and Systems Lab. 1 Hour.**

Transformers, DC motors and generator performance and characteristics, synchronous machine performance and characteristics.

**EE 345. Engineering Electromagnetics. 3 Hours.**

PR: WVU sections require MATH 261 and PHYS 112, WVUIT sections require MATH 261 and PHYS 112 and EE 223. Continued use of vector calculus, electrostatics, magnetostatics, Maxwell's Equations, and boundary conditions. Introduction to electromagnetic waves, transmission lines, and radiation from antennas.

**EE 365. Analog Electronics. 3 Hours.**

PR: EE 221 and EE 222. Semiconductors, p-n junction diodes, theory and application. Bipolar junction transistors, operation biasing and BJT as an amplifier. JFET's and MOSFET's theory operation and applications. Small-signal low-frequency analysis and design.

**EE 366. Analog Electronics Laboratory. 3 Hours.**

PR or CONC: EE 365. Design, fabrication, and measurement of analog electronic circuits. Study of biasing, stability, and frequency response.

**EE 385. Junior Seminar. 1 Hour.**

Professional and ethical standards of practicing electrical and computer engineering are explored. Economic, environmental and Societal impacts of electrical and computer engineering as well as current issues, topics and news items relating to electrical engineering are examined and discussed. Building upon both oral and written laboratory reports within the curriculum, students prepare, deliver, and evaluate oral presentations.

**EE 400. Community Service. 0 Hours.**

All BSEE students must complete 20 hours of community service. The successful BSEE and BSCPE student is expected to complete and evaluate service as a citizen of the local community.

**EE 405. Protective Relaying. 3 Hours.**

PR:EE 403. General philosophy of protective relaying-relay systems, selection of circuit breakers, classification of relays, back-up protection. Protection basics, relay coordination, CT/VT selection, relay characteristics, amplitude and phase comparators, basic design concepts. Differential, directional, over-current, impedance, admittance, reactance relays, characteristics and applications. Burden calculation protective relaying schemes for generators, transformers, busses, and transmission lines. relay coordination for radial distribution systems.

**EE 411. Fundamentals of Control Systems. 3 Hours.**

PR: EE 327. Introduction to classical and modern control; signal flow graphs; state-variable characterization; time-domain, root locus, and frequency techniques; stability criteria. (3 hr. lec.).

**EE 412. Automatic Control Lab. 1 Hour.**

PR or CONC: EE 424. Computer-aided control design and server mechanisms. Experimentation, verification and reinforcement of automatic control fundamentals for analysis and design.

**EE 413. Introduction to Digital Control. 3 Hours.**

PR: EE 327. Sampling of continuous-time signals and transform analysis. Stat-variable analysis for linear discrete-time systems and design of digital controller. (3 hr. lec.).

**EE 427. Introduction to Robotics. 3 Hours.**

Basic components of robot systems; coordinate frames, homogeneous transformations kinematics for manipulator inverse kinetics; manipulator dynamics, Jacobian, control of manipulator and robotic programming. Project required.

**EE 431. Electrical Power Distribution Systems. 3 Hours.**

PR: EE 335 and EE 336 or consent. General considerations; load characteristics; subtransmission and distribution substations; primary and secondary distribution, secondary network systems; distribution transformers; voltage regulation and application of capacitors; voltage fluctuations; protective device coordination. (3 hr. lec.).

**EE 434. Alternative Energy Resources. 3 Hours.**

PR: EE 335 and EE 336. Working principles of alternative distributed energy technologies. Modeling, control, interconnection methods, and applications of modern alternative power generation resources. Future directions of alternative energy.

**EE 435. Introduction to Power Electronics. 3 Hours.**

PR: EE 335 and EE 355 and EE 356 or consent. Application of power semiconductor components and devices to power system problems; power control; conditioning processing, and switching. Course supplemented by laboratory problems. (3 hr. lec.).

**EE 436. Power Systems Analysis. 3 Hours.**

PR: EE 335 and EE 336. Power system network modeling, network calculations by matrices, node equations, node elimination, bus admittance, impedance matrices, and fault calculations. Transmission line inductance, capacitance, network models, and power circle diagrams. Symmetrical and unsymmetrical faults. Load flow and economic dispatch.

**EE 437. Fiber Optics Communications. 3 Hours.**

PR: EE 329 and EE 345. Fundamentals of optics and light wave propagation, guided wave propagation and optical wave guides, light sources and light detectors, couplers, connections, and fiber networks, modulation noise and detection in communication systems. (3 hr. lec.).

**EE 445. Introduction to Antennas. 3 Hours.**

PR: EE 345 or equivalent. Development of Maxwell's equations and general electromagnetic theory underpinning broadcast communication systems, wave propagation, antennas and antenna arrays.

**EE 452. Network Synthesis. 3 Hours.**

PR: EE 326 Passive and active filter design using classic filter responses. Topics covered include the Butterworth, Chebyshev and Bessel approximations. Biquadratic functions and design of filters. Sensitivity and computer programs. Design project required.

**EE 456. RF Design. 3 Hours.**

PR:EE 332. Discrete and integrated components for AM, FM, and SSB circuits. High frequency analysis of BJT, FET, and MOSFET circuits. Oscillators; mixers; power amplifiers; phone systems; modems; RF tests and measurements. Requires prototyping lab.

**EE 461. Introduction to Communications Systems. 3 Hours.**

PR: EE 329. Application of random processes and spectral analysis to the design and analysis of communication systems. Analysis and comparison of standard modulation techniques relative to bandwidth, noise, threshold, and hardware constraints.

**EE 463. Digital Signal Processing Fundamentals. 3 Hours.**

PR: MATH 251 and EE 327. Theories, techniques, and procedure used in analysis, design, and implementation of digital and sampled data filters. Algorithms and computer programming for software realization. Digital and sampled data realizations, switched capacitor and charge-coupled device IC's. (3 hr. lec.).

**EE 479. Special Projects. 1-3 Hours.**

PR: Consent. Design and fabrication of an electrical or electronic system or device. A formal report is required.

**EE 480. Capstone Project - Design. 3 Hours.**

PR: ENGL 102 or ENGL 103 and consent. Penultimate semester. Group senior design projects with individual design assignments appropriate to student's discipline. Complete system-level designs of the subsequent semester's project presented in written proposals and oral presentations. (Equivalent to BIOM 480, CPE 480, CS 480) (2 hr. lec., 1 hr. conf.) Note: WVU Tech course is 3 credit hours.

**EE 481. Capstone Project - Implementation. 3 Hours.**

PR: EE 480. Detailed design and implementation of the system including choice of components, algorithm development, interfacing, trouble shooting, working in groups, and project management. Also covers professional topics, including ethics, liability, safety, socio-legal issues, risks and employment agreements. (1 hr. lec., 1 hr. conf., 2 hr. lab.).

**ELECTRONIC ENGINEERING TECHNOLOGY****ELET 171. Direct Current Circuit Analysis. 4 Hours.**

Co-req: MATH 113. An introductory course in DC circuits analysis including resistor, capacitor, and inductor circuits. Computer simulation and laboratory experiments are used to verify circuit theorems and theory. Use of testing and troubleshooting instruments in a laboratory environment is emphasized. An introduction to computer circuit analysis simulation software such as Electronic Workbench is included.

**ELET 172. Circuit Analysis. 4 Hours.**

PR: ELET 171 and MATH 113 and MATH 114. A study of the steady-state sinusoidal response of electrical circuits through the utilization of the phasor method of network analysis; sinusoidal waveforms; phase relations; reactances and impedances; fundamental methods of analyzing series, parallel, and series-parallel AC circuits; circuit theorems in the complex frequency domain; real, apparent and reactive power; basic resonant circuit analysis; and system frequency response. Computer simulation and laboratory experiments are used to verify theorems and theory. Use of testing and troubleshooting instruments in a laboratory environment is emphasized. Use of computer circuit analysis simulation software such as Electronics Workbench is included.

**ELET 181. Analog Devices 1. 4 Hours.**

PR: ELET 171 and MATH 113 and MATH 114. A study of electronic devices including basic semiconductor theory; characteristics and application of diodes and other two-terminal semiconductor devices; theory of operation and DC biasing of bipolar-junction and field-effect transistors; and an introduction to AC applications and device modeling. Use of computer circuit analysis simulation software such as Electronics Workbench is included.

**ELET 236. Programmable Logic Control Applications. 3 Hours.**

PR: ELET 171 and MATH 113 and MATH 114. This course covers topics central to programmable logic control (PLC) applications including ladder rung logic, PLC software, basic machine control functions, timers, counters, basic machine control, and an introduction to graphic display systems. Hands-on laboratory exercises and simulations augment the classroom environment.

**ELET 274. Electrical Control Systems. 3 Hours.**

PR: ELET 171. (For non-EET majors) The course provides introduction to the principles of operation of motors, generators, transformers and motor controls, both the fundamental and practical applications. Electro-mechanical and solid state electronic control devices and systems are covered.

**ELET 275. Power Systems and Industrial Devices. 4 Hours.**

PR: ELET 172. A study of polyphase industrial and commercial power utilization; polyphase AC motors; DC motors and generators; transformers, including sizing, testing, winding connections efficiency and voltage regulation; industrial motor controllers and protective devices; lighting system design principles and practices; conductor insulation classifications; and National Electric Code. Students are required to complete a design project including a formal report and oral presentation.

**ELET 282. Analog Devices 2. 4 Hours.**

PR: ELET 172 and ELET 181. Topics include transistor AC models; small-signal analysis; multistage characteristics and response; power amplifiers; construction, characteristics, and applications of linear integrated circuits including operational amplifiers; and the computer analysis of amplifiers.

**ELET 285. Digital Devices. 4 Hours.**

PR: ELET 181 The analysis of digital systems through the study of number systems, logic gates, specific design techniques using simple logic gates and commercially available digital devices such as flip-flops, counters, shift registers, etc., with emphasis on application of present and future digital integrated circuits; introduction to micro-processors.

**ELET 286. Communications Systems 1. 4 Hours.**

Co-Req: ELET 282. Introduction to frequency spectrum analysis of sinusoidal waveforms, response analysis, and noise effects. Analog modulation techniques to include AM, FM, etc. Frequency domain; real, apparent and reactive power, basic resonant circuit analysis, and system frequency response. Introduction to communication systems, transmission lines, fiber optics, and atmospheric and free space propagation, use of computer circuit simulation software such as Electronics Workbench. Students are required to complete a design project including a formal report and oral presentation.

**ELET 287. Biomedical Equipment Technology. 4 Hours.**

PR: ELET 171 and MATH 113 and MATH 114. An introduction to the use, maintenance, and repair of biomedical equipment. Other topics include electrical safety, radiology, and nuclear medicine, and the use of computers in biomedical equipment.

**ELET 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ELET 315. Electronic Measurement and Instrumentation. 4 Hours.**

PR: MATH 117 or Consent. The application of electrical and electronic circuits-including discrete, integrated, linear, and digital components-to instruments used to measure and record physical quantities. Introduction to theory, units and error analysis in the measurement of physical parameters. Also covered are noise reduction, communication circuits, interface topics, and troubleshooting techniques.

**ELET 337. Communication Systems 2. 4 Hours.**

PR: MATH 315 and Jr status or Consent. An introduction to digital modulation techniques, error detection/correction, and communication systems, Analog and digital voice and data transmission, copper and fiber optic transmission media, and network (LAN/WAN) topology and protocols. Use of computer circuit analysis, simulation software such as Microsim Pspice, MATLAB, SysView, or Electronics Workbench.

**ELET 375. Power Systems and Industrial Devices. 4 Hours.**

A study of polyphase industrial and commercial power utilization. This course covers polyphase AC motors; DC motors and generators; transformers, including sizing, testing, winding connections, efficiency and voltage regulation; industrial motor controllers and protective devices; lighting system design principles and practices; conductor insulation classifications; and National Electric Code. Students are required to complete a design project as part of the final grade. The project includes a formal report and oral presentation.

**ELET 410. Control Systems Technology. 3 Hours.**

PR: MATH 315 A study of continuous control systems in open and closed loop. Transfer functions in the frequency domain and the system's time domain response are included. Components including op-amps, potentiometers, synchros, motors, amplifiers, tachometers and transducers; and the industrial control process concepts and systems are covered. The emphasis is on closed-loop feedback systems, system characteristics, and stability analysis. The use of the microcomputer in system control, system analysis, and simulation is introduced.

**ELET 415. Mechatronics. 4 Hours.**

PR: GNET 410 and ELET 315 with a minimum grade of C in each or consent. This course provides an introductory experience into the design of mechatronic systems and centers around a laboratory experience in which students design and build a succession of mechatronic subsystems, leading to an integrated system in a final project. Laboratory experiments will be done interfacing Python's programming Raspberry Pi with use of associated sensors and actuators.

**ELET 420. Microprocessors and Digital Systems. 4 Hours.**

This course covers such topics as analog/digital and digital/analog circuits. It emphasizes circuit minimization techniques such as Karnaugh mapping, variable entered maps, and the Quine McCluskey Method. Other areas explored include LSI circuits, such as multiplexers and demultiplexers, decoders, and memory devices. The course also includes an introduction to state machine design. Characteristics of logic families are covered. The final one-third of the course is an introduction to microprocessor architecture.

**ELET 426. Microprocessor-Based Data Acquisition and Control. 4 Hours.**

PR: ELET 410 and ELET 420 or Consent. Introduction to microprocessors, microcontrollers, and data acquisition and control topics. The application of assembly language programming is covered. Application of Intel 8051 family microcontrollers are introduced and several hardware applications including memory interfacing, timing considerations, and serial I/O are investigated through lab exercises. PC based data acquisition boards and high level visual programming environments are introduced through lab exercises.

**ELET 431. Microcomputer Operating Systems. 4 Hours.**

PR: ELET 420 Microcomputer operating systems, assembly languages, application of software to the solution of technical problems.

**ELET 432. Process Instrumentation. 4 Hours.**

PR: ELET 320 Application of physical principles to the measurement of flow, temperature, pressure, level, etc. Signal conditioning for digital and computer readout and controllers.

**ELET 433. Process Control Systems Technology. 4 Hours.**

PR: ELET 410 and ELET 420 or Consent. An introduction to the process control loop and its composite elements; process concepts and characteristics; devices for measuring process variables such as temperature, level, flow, pressure, etc.; controllers; control valves; and process computers. There is extensive investigation of computer simulation tools in the process control area. Laboratory experiments illustrate device applications and control loop performance.

**ELET 436. Programmable Logic Controllers. 4 Hours.**

PR: Jr status A study of PLC's and their applications to factory automation and industrial control. Includes laboratory experience with programming in ladder logic and hard-writing PLC's to external devices.

**ELET 489. Senior Projects. 1-4 Hours.**

PR: Consent Selected projects and/or research for senior students in current topics. Projects must be approved by faculty prior to registration.

**ELET 493. Special Topics. 1-6 Hours.**

Investigation of topics not covered in regularly scheduled courses.

**ELET 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENGINEERING****ENGR 101. Engineering Problem Solving 1. 2 Hours.**

PR or CONC: MATH 154 or MATH 155. Engineering problem solving methodologies and analysis. Use of computers in problem solving, technical report writing, team based project work and presentations.

**ENGR 111. Software Tools for Engineers. 3 Hours.**

PR or CONC:MATH 125 or MATH 126 and MATH 128. Use of software tools such as spreadsheets, numerical and symbolic mathematical analysis packages. Study of programming concepts and techniques. Preparation of graphs, interpolation and curve fitting, numerical integration and differentiation, and solution of linear and non-linear simultaneous equations. Emphasis is on the application of numerical methods and software applications. Laboratory practice is required.

**ENGR 129. Engineering Mathematics. 1 Hour.**

PR: Consent. Review of key pre-calculus and early calculus concepts and topics for engineering students.

**ENGR 401. Senior Engineering Seminar. 1 Hour.**

PR:Senior status Ethics and professionalism, engineering safety, copyright and liability issues. Citizenship, role of the engineer in Society, current issues in engineering, ecological considerations and impact of globalization.

**ENGR 402. Fundamentals of Engineering Review. 2 Hours.**

PR:Senior standing. This course provides information and review materials for students planning to take the Fundamentals of Engineering (FE) exam. This course requires prior knowledge of the subject matter and will concentrate on problem solving and review. Basic concepts will be referenced, but will be explained only where the majority of students lack earlier exposure to the material. The topics included are statics, dynamics, mechanics of materials, fluid mechanics, mathematics, probability and statistics, chemistry, engineering economics, electricity and magnetism, material properties, thermodynamics, computers, and ethics and business practices.

**ENGR 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ENGINEERING TECHNOLOGY****GNET 308. Advanced Computer Applications. 3 Hours.**

PR:MATH 117 or Consent. This course uses personal computers to select topics in advanced problem solving methodologies found in technology fields. Students will learn to use selected advanced computer applications software or programming languages in solving problems in technical calculus, statistics, graphics, matrices, complex variables, robotics, and advanced topics in engineering technology fields.

**GNET 311. Software Tools for Engineering Technology. 3 Hours.**

PR:MATH 117. Use of software tools such as spreadsheets, numerical and symbolic mathematical analysis packages. Study of programming language, including elementary programming concepts and techniques. Preparation of graphs, interpolation and curve fitting, numerical integration and differentiation, and solution of linear and non-linear simulation equations. Emphasis is on the application of numeric methods and software applications. Laboratory practice is required.

**GNET 410. C++ Programming for Technology. 3 Hours.**

PR:Jr status or Consent. Emphasis on using C++ programming language in solving technology problems. Topics include the "C environment, structured programming, technical calculations and functions, relational and logical operation, branches, loops, arrays and file creation.

**GNET 412. Project Management. 3 Hours.**

PR: Jr standing. The primary focus of this course is the analysis and management techniques used to implement a successful project. Topics include: project planning, project scheduling and staffing, and project control; administration, economic analysis, and reporting procedures; and material and labor cost estimating. Project management software will be introduced, a project will be analyzed, and an in-depth project report will be generated/presented.

**GNET 489. Senior Seminar and Project. 2 Hours.**

PR:Senior status Seminar on topics relating to improving processes, design, teamwork, problem solving, communication skills, lifelong learning, professional and ethical issues, total quality, time management, and continuous improvement. Final project aimed at combining the skills and knowledge gained from the various areas of study in the student's field. The student will be expected to report graphically, orally and in written form on a final project approved by a departmental advisor. Presentations will be made to a representative board of the faculty.

**GNET 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENGINEERING TECHNOLOGY - CIVIL****CIET 114. Statics. 3 Hours.**

PR: MATH 113 and Co-req: MATH 114. Study of the fundamental principles of mechanics and rigid bodies and the application of these principles to engineering problems.

**CIET 115. Strength of Materials. 3 Hours.**

PR: CIET 114 and MATH 114. This course includes fundamental stress/strain relationships, torsion, shear and bending moments, stress and deflections in beams and columns, and combined stresses. Laboratory experiments involve tension, compression, shear, impact, and fatigue.

**CIET 131. Construction Materials. 3 Hours.**

This course is a study of a wide range of materials including steel, nonferrous metals, glass and ceramics, concrete, synthetics and wood.

**CIET 141. Surveying 1. 3 Hours.**

PR: MATH 114 and DRET 120. Fundamental concepts of surveying and their use in acquiring the data necessary for the preparation of topographic maps. Use of appropriate equipment is emphasized in field labs and current computer software is employed where appropriate.

**CIET 144. Surveying 2. 4 Hours.**

PR: CIET 141. Application of surveying principles in the design and construction of engineering works including profiles and cross-sections, construction surveys and earthwork computations. In the field labs, appropriate equipment and techniques are employed in the performance of control and location surveys. Includes extensive use of current computer packages and integration with other relevant software.

**CIET 215. Structural Steel Design. 3 Hours.**

PR: CIET 114. Co-Req: CIET 115. A practical study of the analysis and design of steel structural members used in the construction of highways, buildings, and industrial facilities including simple beams, columns and connections.

**CIET 216. Structural Concrete Design. 3 Hours.**

PR: CIET 114 and CIET 115. Practical study of the analysis and design of elementary reinforced concrete structural members, including beams, columns, footings, and retaining walls.

**CIET 222. Soils and Foundations. 3 Hours.**

PR: CIET 114 and CIET 115. Origin, composition, classification of soils; fundamental soil properties and stresses in soils. Introduction to design and construction of earth structures. Field and laboratory testing.

**CIET 230. Hydraulics and Drainage. 3 Hours.**

PR: PHYS 201 or consent. Principles of hydrostatics; fundamental concepts of fluid flow in pipes and open channels; methods of estimating storm water runoff; sizing of culverts, storm and sanitary sewers, and open channels. Laboratory experience relates classroom theory through experiments and/or hydraulic computer software.

**CIET 245. Highways. 3 Hours.**

PR: CIET 144. Highway planning and design. Topics: design characteristics, standards, surveying and mapping, geometric design, pavements, earthwork, drainage, safety and environmental considerations. This is the capstone course and includes a research project and presentation.

**CIET 310. Surveying Laws. 3 Hours.**

The theory and legal principles of various real property ownerships and rights including conveyances of title to real property will be emphasized. The laws of evidence used to resurvey real property boundaries including rules of evidence evaluation and the role of the property surveyor in boundary disputes and litigations will also be dealt with in this course. Drawing of legal descriptions of (various types and preparation of abstracts along with actual court house research will be included.)

**CIET 320. Construction Methods and Equipment. 3 Hours.**

PR: Jr status or consent. Study of the methods used in civil engineering construction and the management of equipment that relates to these methods. Topics include earthwork, roads, pipelines, foundations and construction in concrete, masonry, steel, and timber. The course will be supplemented by organized field trips to construction sites.

**CIET 325. Codes, Contracts, and Cost Analysis. 3 Hours.**

PR: Jr status. Construction planning. Economics and time value of money, use of interest formulas, inflation, depreciation, construction documents; construction contract administration; professional ethics construction scheduling using Gantt charts, critical path and PERT. Use of industry-standard software for planning and scheduling.

**CIET 330. Computer Applications in Hydraulics and Hydrology. 3 Hours.**

Review of principles of hydraulics and hydrology; hydraulic calculations using Flowmaster; and storm sewer design using StormCAD. Use of other industry-standard software for water resources applications with emphasis on Haestad Methods.

**CIET 341. Surveying 1. 3 Hours.**

PR: MATH 114 and DRET 120. Fundamental concepts of surveying and their use in acquiring the data necessary for preparation of topographic maps. Topics include notekeeping, measurement of distances, angles and elevations on the earth's surface; azimuth and bearing calculations; field traversing and traverse calculations and methods of topographic mapping. Use of appropriate equipment is emphasized in field labs. Use of current computer software is employed where appropriate.

**CIET 355. Construction Estimating. 3 Hours.**

This course is intended to provide students with the ability to estimate the cost of the various activities that constitute a construction project. Issues to be considered include contract documents, the bid-award process, types of estimates, breakdown of project, elements of the estimate, quantity take off techniques, estimating labor, material and equipment costs, use of experience tables and databases, adjustments for overhead, profit and contingencies, assembling the estimate. Considerate use will be made of spreadsheets and an industry-standard estimating computer software package.

**CIET 382. Environmental Engineering Technology. 3 Hours.**

PR: Jr status. This subject deals water and air quality, stream pollution; purification of water, treatment and disposal of municipal wastewater; aspects of municipal solid waste and hazardous waste management; and environmental regulations and impact. Included are routine environmental calculations and elements of design of treatment and pollution control systems. Basic lab and field tests and sampling techniques are also covered. Numerous field trips are included.

**CIET 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**CIET 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENGINEERING TECHNOLOGY - MECHANICAL****MEET 121. Manufacturing Processes 1. 3 Hours.**

Co-Req: DRET 120 and MATH 40 and MATH 41 or ACT MATH score of 18 or higher. An introductory course combining the machine tool field with the welding and casting fields. A basic knowledge of the terminology and processes used in both machine tools and welding fields. Laboratory experience on lathes, grinders, milling machines, shapers, and drills in the machine tool area; welding and casting. Special projects are produced.

**MEET 122. Manufacturing Processes 2. 3 Hours.**

PR: MEET 121 and DRET 120. Co-Req: MATH 113. An advanced course in the production and manufacturing systems, process capability, quality control; Computer Numerical Control machines, casting processes, milling machines, ferrous and non-ferrous metallurgy, heat and surface treatment of metals, inspection, and safety are also covered. Special lab projects incorporate production operations.

**MEET 225. Mechanical Design 1. 3 Hours.**

PR: DRET 120 and MATH 113 and MATH 114 and MEET 121 or consent. A course in mechanical component terminology, specification, and integration. The following will be covered; couplings, clearance and interference fits, V-belts, HTD drives, keys and keyways, sprocket drive systems, gears and bearings.

**MEET 226. Mechanical Design 2. 3 Hours.**

PR: MEET 225 and DRET 121 and CIET 115 and MEET 240. The primary focus of this course is system integration. Design projects will be assigned throughout and oral presentations will be required. This course also covers the following: centrifugal pumps, eccentric loading, bolts and fasteners, welded connections, sleeve bearings, mechanical seals, alignment, economic analysis, maintainability, and other related topics.

**MEET 240. Fluid Power. 3 Hours.**

PR: MATH 113. An applied hydraulics course with special emphasis on factory or industrial hydraulic systems. Introduction to fluid mechanics, and mobile equipment and mining machinery. Subject matter includes types of hydraulic pumps and motors, cylinders, directional valves, sequence and counterbalance valves, volume controls, pressure-reducing valves, specifications for piping and filtration, etc.

**MEET 250. Climate Control. 4 Hours.**

PR: MATH 113 and PHYS 201. Overview of fundamental concepts of thermodynamics including energy equations, gas laws energy cycles, and vapor cycles; heating, cooling, and ventilation fundamentals including the design of heating and cooling installations. Humidity calculations using psychrometric charts, electrical control systems, solar heating, and design fundamentals are also covered.

**MEET 316. Dynamics. 3 Hours.**

PR: MATH 117. A study of mass moment of inertia; rectilinear, angular, and planar motion; work, energy, and power; and impulse and momentum as applied to technology.

**MEET 393. Special Topics. 6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**MEET 435. Energy Conversion Systems. 3 Hours.**

PR: MATH 117 and PHYS 201 and Jr status or Consent. An introduction to energy conversion through a study of thermal heat and power. Fundamental thermodynamic processes, cycles, and systems will be covered. Applications studied will include electric power generation, internal combustion engines, material science, refrigeration, and air conditioning processes.

**MEET 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**MEET 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENGLISH****ENGL 1C1. Introduction to Composition and Rhetoric. 3 Hours.**

Studies the logical, rhetorical, and linguistic structures of expository prose; develops strategies for analyzing purposes, audiences, and conventions; emphasizes processes for drafting, revising, and editing. Required of all bachelor's degree candidates unless equivalent transfer credit or portfolio credit applies. Qualified students may complete ENGL 103 in place of ENGL 101 and 102. Co-requisites will differ at WVUIT and PSC.

**ENGL 1C2. Composition, Rhetoric, and Research. 3 Hours.**

PR: ENGL 101 or equiv. Builds on the writing abilities earned in English 101 (or the equivalent). Focuses on the research process, argumentation, and critical inquiry; emphasizes structures, language, documentation, and formats appropriate for specific audiences and purposes. Required of all bachelor's degree candidates unless equivalent transfer credit or portfolio credit applies.

**ENGL 100. English 100 Writing Studio. 2 Hours.**

PR: Consent. Additional support of basic reading and writing skills for students taking ENGL 101. Enables students to have the reading, writing, critical thinking and language skills necessary to function effectively and succeed in pursuit of their degrees and in the global economy.

**ENGL 101. Introduction to Composition and Rhetoric. 3 Hours.**

Studies the logical, rhetorical, and linguistic structures of expository prose; develops strategies for analyzing purposes, audiences, and conventions; emphasizes processes for drafting, revising, and editing. Required of all bachelor's degree candidates unless equivalent transfer credit or portfolio credit applies. Qualified students may complete ENGL 103 in place of ENGL 101 and 102. Co-requisites will differ at WVUIT and PSC.

**ENGL 102. Composition, Rhetoric, and Research. 3 Hours.**

PR: ENGL 101 or ENGL 1C1 or equiv. Builds on the writing abilities earned in English 101 (or ENGL 1C1 or the equivalent). Focuses on the research process, argumentation, and critical inquiry; emphasizes structures, language, documentation, and formats appropriate for specific audiences and purposes. Required of all bachelor's degree candidates unless equivalent transfer credit or portfolio credit applies.

**ENGL 111. Introduction to Creative Writing. 3 Hours.**

Instruction in reading and writing fiction, nonfiction and poetry in order to enhance creative writing skills.

**ENGL 131. Poetry and Drama. 3 Hours.**

An introduction to the genres.

**ENGL 132. Short Story and Novel. 3 Hours.**

An introduction to the genres.

**ENGL 224. World Literature. 3 Hours.**

PR:ENGL 102 or Consent. Great literature from outside the United States and Great Britain; includes both Western and Non-Western Literature.

**ENGL 232. Poetry. 3 Hours.**

Appreciation and enjoyment of poems through critical and analytical reading. Studies in the various types of poetry, and of the language, imagery, and techniques of poetic expression.

**ENGL 233. The Short Story. 3 Hours.**

The short story's structure, history, and contemporary forms.

**ENGL 234. Drama. 3 Hours.**

The drama's structure, history, and contemporary forms.

**ENGL 235. Novel. 3 Hours.**

The novel's structure, history, and contemporary forms.

**ENGL 236. The Bible as Literature. 3 Hours.**

Analysis of the themes, topics and literary genres of the Old and New Testaments. Issues to be discussed include the unity of the text, the status of authorship, translation, and the depiction of God.

**ENGL 241. American Literature 1. 3 Hours.**

A historical introduction and survey from its beginnings to the mid-nineteenth century.

**ENGL 242. American Literature 2. 3 Hours.**

A historical introduction and survey from the mid-nineteenth century to the present.

**ENGL 252. Appalachian Fiction. 3 Hours.**

Reading of short stories, novels, and other narratives by Appalachian authors.

**ENGL 254. African American Literature. 3 Hours.**

Studies in the literature of African American authors, 1845 to the present.

**ENGL 257. Science Fiction and Fantasy. 3 Hours.**

A study of the history and nature of science fiction from H. G. Wells to the present, with special attention to features of prose narration.

**ENGL 258. Popular American Culture. 3 Hours.**

A survey of modern popular American culture from 1940 to the present, with special emphasis on popular literature, music, television, movies, radio in its golden age, and comic books.

**ENGL 261. British Literature 1. 3 Hours.**

A historical introduction and survey from the Middle Ages through the eighteenth century.

**ENGL 262. British Literature 2. 3 Hours.**

A historical introduction and survey from the late eighteenth century to the present.

**ENGL 263. Shakespeare 1. 3 Hours.**

Several of Shakespeare's most important plays.

**ENGL 272. Modern Literature. 3 Hours.**

British and American poetry, drama, and fiction from 1900 to 1960.

**ENGL 285. Images of Women in Literature. 3 Hours.**

Representative literary works studied against a backdrop of social and historical documents to examine the effect of images of women in literature on the self-image of women today.

**ENGL 287. Governor's Portfolio. 3 Hours.**

Required course for students in the board of Governors program who seek to petition credits based on training, and/or work experiences. Students will learn the basics of writing and assembling a portfolio.

**ENGL 301. Writing Theory and Practice. 3 Hours.**

PR: (ENGL 101 and ENGL 102) or ENGL 103. Tradition and contemporary approaches to rhetoric and writing theory for professional writing and editing students who wish to develop their abilities to analyze and produce written texts.

**ENGL 302. Editing. 3 Hours.**

A comprehensive approach to editing, including the correctness and effectiveness of a document, information design, and editorial responsibility. Students gain a realistic perspective on workplace practice through real-world scenarios, case studies, and technological applications.

**ENGL 303. Multimedia Writing. 3 Hours.**

Study of communication and design issues in multimedia composition. Focuses on communication, creative expression, persuasion, interactivity, and rhetorical principles. Practice in composing multimedia documents such as online publications, interactive literary works, and tutorials.

**ENGL 305. Technical Writing. 3 Hours.**

PR: (ENGL 101 and ENGL 102) or ENGL 103. Writing in scientific and technical fields. Introduces students to typical genres, workplace practices, document design, and conventions of writing for experts and non-experts.

**ENGL 306. Topics in Humanities Computing. 3 Hours.**

Topics include: literary studies (electronic publications, web-based interactive fiction, poetry, drama, nonfiction), creative writing in digital media, composition online, pedagogy, cultural studies of electronic media, online communications, language studies. Topics rotate; check with the instructor for current topic.

**ENGL 307. Topics in Journalistic Writing. 2 Hours.**

PR: ENGL 102 or Consent. For students working regularly and actively on campus publications. Individualized instruction in reporting feature writing, or copy reading and editing. The course may be taken for a maximum of three semesters and six hours credit.

**ENGL 321. History of the English Language. 3 Hours.**

PR: ENGL 221 or LING 101 or LING 311 or instructor's permission. Study of the nature of the language; questions of origins, language families, development, relationships of English as one of the Indo-European languages.

**ENGL 331. Topics in Genre. 3 Hours.**

This variable-topic course will trace formal and thematic conventions in poetry, drama, prose, fiction, and/or nonfiction.

**ENGL 352. Topics in Appalachian Studies. 3 Hours.**

Studies of authors, genres, themes, or topics in Appalachian literature.

**ENGL 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**ENGL 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**ENTREPRENEURSHIP****ENTR 201. Business Planning. 3 Hours.**

Process of business planning and putting a business plan together. Skills needed to understand revenue recognition, resources needed to start a business, principles of entrepreneurship, business organization, and the language of business.

**ENTR 300. Creativity and Idea Generation. 3 Hours.**

This course is about enhancing your personal creativity: seeing what others do not see, thinking what others do not think; coming up with new ideas.

**ENTR 400. Fundamentals of Entrepreneurship. 3 Hours.**

PR: Sophomore standing. Fundamental principles and practices related to entrepreneurship. Focuses on areas such as leadership, motivation, human resource management as they apply to entrepreneurship.

**ENTR 420. Entrepreneurial Finance. 3 Hours.**

PR: ACCT 201 and ACCT 202 and PR or CONC: ENTR 400 with a minimum grade of C- in all. Fundamental principles and practices in finance related to entrepreneurship. Focuses on areas such as accounting, budgeting, and financial management as they apply to entrepreneurship.

**ENTR 421. Entrepreneurial Accounting. 3 Hours.**

Fundamental principles and practices related to entrepreneurial accounting. Focuses on areas such as, cash management, comprehensive budgets, and traditional and proforma financial statements.

**ENTR 450. Entrepreneurial Marketing. 3 Hours.**

Fundamental principles related to entrepreneurial marketing. Focuses on areas such as, marketing strategy, creating values, pricing, promotion, and brand strategy.

## **EXERCISE PHYSIOLOGY**

**EXPH 364. Kinesiology. 3 Hours.**

PR: MATH 124 or higher or (ACT math score of 26 or SAT math score of 580 and (QRA Part 1 score of 15 and QRA Part 2 score of 9)) and sophomore standing or consent. Anatomical, mechanical, and musculoskeletal study of the human body as the instrument for efficient performance of motor activities. (Laboratory work included.).

**EXPH 365. Exercise Physiology 1. 3 Hours.**

PR: Junior standing or consent. The study of the functioning of body systems during exercise and the acute and chronic adaptations that occur from exercise stress.

## **FINANCE**

**FIN 202. Business Finance. 3 Hours.**

A Study of the activities of the finance manager in the planning, acquisition, and administration of funds used in a business enterprise. Types of securities and financial structures. Financing through securities.

**FIN 310. Investments. 3 Hours.**

PR: (BCOR 340 or FIN 325) with a minimum grade of B- and PR or CONC: FIN 330. Investment analysis and management for the individual and the financial institution.

**FIN 321. Personal Finance. 3 Hours.**

Issues concerning the management of personal wealth. Topics include: personal financial statements & records; budgeting; personal income taxes; consumerism; use of credit; housing & real estate; insurance; investment; and retirement planning.

**FIN 325. Financial Management 1. 3 Hours.**

PR: ACCT 202 and ECON 201 and MATH 124. Nature of financial management; financial environment; some fundamental concepts of financial management-financial ratios; financial analysis, planning and control; time value of money. Capital budgeting Risk-return analysis.

**FIN 326. Financial Management 2. 3 Hours.**

PR: FIN 325 and MANG 386. Continues the discussion of fundamental of financial management begun in FIN 325. Management of working capital; international finance; cost of capital; financial leverage; long-term finance. Use is made of the case studies method.

**FIN 328. Financial Statement Analysis. 3 Hours.**

## **FORENSIC INVESTIGATION**

**FRNX 101. Introduction to Forensic Investigation. 3 Hours.**

Covers the history, organization, and functions of Forensic Investigation organizations; how disciplines of science produce evidence; and science's role in the courtroom. Introduces types of crime scenes and how they are processed.

**FRNX 210. Fingerprint Evidence Analysis. 4 Hours.**

Explores the collection, classification, and comparison of friction-ridge skin prints; the application of probability in decision-making; and photographic and chemical-processing techniques applied to the recovery of latent friction-ridge detail.

**FRNX 212. Advanced Fingerprint Evidence. 3 Hours.**

FRNX 212. Advanced Fingerprint Evidence. 3-Hr. The identification of unknown to known impressions ranging from easy to extremely difficult; ways latent prints can be distorted; "smart" searching protocols, and a deeper understanding of the formation of friction ridge skin.

**FRNX 224. Automated Fingerprint Identification Systems. 3 Hours.**

Introduction to Automated Fingerprint Identification Systems (AFIS). AFIS is used in the criminal justice system nationwide. 10-print entry and latent fingerprint entry will be conducted on a daily basis.

**FRNX 301. Investigative Photography. 3 Hours.**

FRNX 301. Investigative Photography. 3-Hr. Covers nomenclature and operation of photographic equipment, with emphasis on lighting, exposure, depth of field, motion-blur and image composition. The use of alternate light sources, crime scene, macro and surveillance photography are highlighted.

**FRNX 310. Firearms and Tool Marks. 3 Hours.**

Explores analysis of impression evidence including odontological, tool marks, foot and tread wear, tire tracks, and firearm-related impression evidence. Includes techniques for evaluating projectile trajectories as well as explosive evidence and post blast scenarios.

**FRNX 311. Trace and Blood Spatter. 3 Hours.**

Covers various types of trace evidence and its collection, preservation, and evaluation; covers bloodstain pattern analysis for incident reconstruction.

**FRNX 312. Digital Evidence Protocols. 3 Hours.**

FRNX 312. Digital Evidence Protocols. 3-Hr. Introduces digital investigations and the acquisition and analysis of digital evidence. Topics include: computer investigations practices, process, working with common computer software and disk structures, current computer tools, and digital evidence controls.

**FRNX 314. Questioned Documents. 3 Hours.**

Theories and principles of the creation, duplication and alteration of written and printed materials. Overview of the methods used to identify the varying elements of printed materials including papers, inks, and creation processes.

**FRNX 315. Interviewing Theory. 3 Hours.**

Covers interviewing theories and techniques to determine emotional states from speech and body language, build rapport, prevent contamination, increase recall, and reduce the risk of false confessions.

**FRNX 316. Death Investigation. 3 Hours.**

FRNX 316. Death Investigation. 3-Hr. Topics include the homicide crime scene, preliminary investigations, scene documentation, estimating time of death, identity of remains, death notification, modes of death, suicides, sex narcotics related homicides, evidence collection, autopsy, and news media.

**FRNX 318. Crime Scenes. 3 Hours.**

FRNX 318. Crime Scenes. 3-Hr. Examines concepts, field-tested techniques and procedures, and technical information concerning crime scene investigation. Focuses on initial responding officer and duties of the investigator on various types of crime scenes.

**FRNX 324. Forensic Anthropology and Osteology. 3 Hours.**

FRNX 324. Forensic Anthropology and Osteology. 3-Hr. Includes background in forensic anthropology, most often associated with the analysis of skeletonized human remains and guidelines for determining when to include and how to choose a forensic anthropologist in death investigations.

**FRNX 326. Investigative Intelligence. 3 Hours.**

FRNX 326. Investigative Intelligence. 3-Hr. This information provides a survey of intelligence techniques for protecting information (counter-intelligence), obtaining information, and analyzing raw information. The impact on public policy and the ethics of intelligence gathering are also covered.

**FRNX 327. Sexual Assault Investigations. 3 Hours.**

FRNX 327. Sexual Assault Investigations. 3-Hr. Explores the role of sexual assault investigation. Includes the history of society's response to sex crimes, investigation techniques, forensic applications, offender typologies and victim studies, legal procedures and judicial decisions, and expert testimony.

**FRNX 422. Cold Case Investigations. 3 Hours.**

FRNX 422. Cold Case Investigations. 3-Hr. Provides an opportunity to work with a local law enforcement agency in re-examining an old case using modern technology. Students should be prepared to travel to crime scene locations and the offices of regional law-enforcement.

**FRNX 484. Senior Seminar in Forensic Investigation. 3 Hours.**

An in-depth analysis of problems and issues in the forensics. Identifies areas for development within a student's forensic education. Includes career and graduate school planning, portfolio, resume, and interview skills.

**FRNX 496. Senior Thesis. 1-3 Hours.**

PR: Consent.

## GEOGRAPHY

**GEOG 102. World Regions. 3 Hours.**

Comparison and relationships of world regions. Geographical perspectives of contemporary global problems. Developing regions contrasted with modernized regions and the consequences of their interactions.

**GEOG 108. Human Geography. 3 Hours.**

This course introduces students to geographic dimensions of important topics in today's world. Students will learn about multiple approaches within human geography, including: cultural, economic, political, and urban geography. Students will use these approaches to understand and think critically about current issues in the world around them, from local to global scales.

**GEOG 240. United States and Canada. 3 Hours.**

Regional study of the United States and Canada emphasizing such geographic features as climate, natural vegetation, topography, natural resources, population distribution and trends, agriculture, manufacturing, transportation systems, and regional culture.

## GEOLOGY

**GEOL 312. Geology. 3 Hours.**

An examination of the earth from its beginning as a planet in the solar system to its present day structure. The course is chiefly concerned with the composition, character and architecture of the earth's crust and with the agencies and processes which are continually altering it. Includes laboratory experience in mineralogy, petrology and mapping and a one-day field trip.

## HEALTH SCIENCE

**HLSC 104. Nutrition. 3 Hours.**

The study of normal and therapeutic nutrition and its implications in health care across the lifespan. Principles of normal nutritional needs of infants, children, adolescents, pregnant, and lactating women, and other adults are studied in relation to the nutrients as provided by the basic four food groups.

**HLSC 204. Pharmacology. 3 Hours.**

PR:BIOL 232 or BIOL 233. This course focuses on the study of pharmacology and its implications for health care of individuals across the lifespan. Legal and ethical pharmacological issues relevant to pharmacotherapeutics are discussed.

**HLSC 485. Interdisciplinary Studies Senior Project. 3-4 Hours.**

Design and completion of Interdisciplinary Project. Requires approval of faculty committee.

**HLSC 493. Special Topics. 1-6 Hours.**

PR:Consent. Investigation of topics not covered in regularly scheduled courses.

## **HISTORY**

**HIST 105. The Middle East. 3 Hours.**

History of the Middle East from the rise of Islam (610 C.E.) to Twentieth Century. Special attention given to religion, gender issues, political developments, economic problems, relations with the West, cultural patterns and changes in the modern era.

**HIST 152. Growth of the American Nation to 1865. 3 Hours.**

(HIST 152 does not have to precede HIST 153.) Examines the basic political, economic, and social forces in formation and development of the United States before 1865. Emphasis on national development from independence through the Civil War.

**HIST 153. Making of Modern America: 1865 to the Present. 3 Hours.**

(HIST 153 may precede HIST 152.) Continues the examination of basic political, economic, and social forces in the development of the United States since the Civil War.

**HIST 179. World History to 1500. 3 Hours.**

Comparative history of Africa, Asia, and Europe from earliest times until 1500. Political, economic, social, and religious developments with emphasis on patterns of authority, the individual, nature, and society.

**HIST 180. World History Since 1500. 3 Hours.**

Comparative history of Africa, Asia, and Europe 1500 to the present. Political, economic, and social developments with emphasis on patterns of authority, the individual, nature, society, and the impact of the West.

**HIST 203. Introduction to Medieval Europe. 3 Hours.**

Treats the emergence of the distinctive culture of Western Europe from the Fall of Rome to the Renaissance, considering the transformation and interaction of politics, economics, society, religion, and ideas.

**HIST 218. History of Russia: 1900-Present. 3 Hours.**

Revolution and reform to 1914; World War, 1917 revolutions; NEP and Stalinism to 1939; World War II and postwar Stalinism; reform under Khrushchev and Brezhnev; Gorbachev and dissolution of USSR; post-Soviet trauma.

**HIST 220. The Holocaust. 3 Hours.**

The origins and development of Nazi genocide against European Jews, focusing on the experience of the victims, the motives of the killers, and the inaction of bystanders.

**HIST 261. Recent America: The United States since 1918. 3 Hours.**

(Primarily for non-History majors.) The 1920's, the New Deal, World War II, and a survey of developments since World War II.

**HIST 275. The Coal Industry in America. 3 Hours.**

The historical development of the coal industry; the technology of extraction, the political and economic context, the United Mine Workers of America, and the particular social problems of the industry will be emphasized.

**HIST 277. Revolutions in Science and Technology. 3 Hours.**

Examines particular periods of intensified change in science and technology, to develop general understanding of scientific and technical change. Episodes may include the Scientific, Industrial, Darwinian, or other revolutions.

**HIST 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**HIST 300. Greece and Rome. 3 Hours.**

Covers the Minoan and Mycenaean civilizations, Archaic and Classical Greece, Alexander the great and the Hellenistic Age, the Roman Republic, the Etruscan and Carthaginian states, and the rise of the Roman Empire.

**HIST 352. History of the South. 3 Hours.**

The colonial South; origins of sectionalism; Southern nationalism; Civil War and reconstruction; the new South; the contemporary South; central theme of Southern history.

**HIST 354. American Frontier. 3 Hours.**

Westward movement before 1890 with particular emphasis on ethnic groups and the associated clash of international cultures on the frontier. Consideration of international claims, native peoples in the market economy, the influence of Manifest Destiny, and economic aspects of fur trading, farming, and mining.

**HIST 355. The African-American Experience. 3 Hours.**

African homeland; origins of slavery in America; slavery during the American Revolution; pre-Civil War South; Reconstruction's meaning for Blacks in the South; Jim Crowism and disfranchisement; Black America in the two World Wars; the Civil Rights Movement.

**HIST 367. History of England. 3 Hours.**

England under Celtic, Roman, and Anglo-Saxon rule; the Norman conquests, the Tudor Monarchy; Elizabethan and Stuart England; England in the Age of the American and French Revolutions; Nineteenth-Century England; England in World War I; England in World War II; the decline of England as a world power.

**HIST 375. Hollywood and History. 3 Hours.**

Examines twentieth century American culture, politics, and society through film. It explores the relationship between film and history using films as primary sources for understanding the past.

**HIST 393. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**HIST 417. World War II in Europe. 3 Hours.**

Impact of World War II on political culture and moral fabric; emphasis on themes of invasion, occupation, collaboration, resistance, survival, and retribution. (Alternate years).

**HIST 420. USSR and After: 1953 to Present. 3 Hours.**

Crisis of late Stalinism; Khrushchev, destalinization, reforms; Brezhnev, stabilization, militarization, corruption, stagnation; Gorbachev, perestroika, glasnost, disintegration; Yeltsin, shock therapy, criminalization, decline.

**HIST 453. Civil War and Reconstruction. 3 Hours.**

Causes as well as constitutional and diplomatic aspects of the Civil War; the role of American black in slavery, in war, and in freedom; and the economic and political aspects of Congressional Reconstruction.

**HIST 455. Cultural and Intellectual History of the United States. 3 Hours.**

Age of Enlightenment and great Awakening; Revolutionary spirit and triumph of common man; science, technology, industrialization, and urbanization; American ideals in literature and the arts.

**HIST 464. American Foreign Relations 1941 to Present. 3 Hours.**

America's foreign policy and growing involvement in international relations including the U.S. role in World War II, the Korean War and Vietnam.

**HIST 471. History of Latin America. 3 Hours.**

Colonial period; wars for independence; 19th century problems; internal confusion and political immaturity; relations with the U.S.; Latin America in the contemporary world.

**HIST 473. Appalachian Regional History. 3 Hours.**

Historical survey of Central Appalachia's three phases of development: traditional society of the nineteenth century, the transformation of a mountain society by industrialization at the turn of the twentieth century, and contemporary Appalachia.

**HIST 479. Readings in History. 3 Hours.**

Directed readings in history with book reviews and consultations.

**HIST 484. Historical Research-Capstone. 3 Hours.**

PR: History major or consent. Capstone course which introduces historical research techniques. Completion and presentation of major research paper required.

**HIST 485. Interdisciplinary Studies Senior Project. 3-4 Hours.**

Design and completion of interdisciplinary project. Requires approval of faculty committee.

**HIST 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**HIST 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**HIST 495. Independent Study. 1-6 Hours.**

HIST 495. Independent Study. 1-6 hr. Faculty supervised study of topics not available through regular course offerings.

**HUMAN SERVICES****HUMS 100. Community Service. 1-3 Hours.**

Arranged field placement in community service. Work hours will vary by credit and project.

**HUMS 210. Introduction to Welfare. 3 Hours.**

A basic course in work that includes an introduction to the concept of welfare history of welfare in the U.S., institutional aspects of welfare, basic work methods, and some techniques of community organization.

**HUMS 220. Public Administration. 3 Hours.**

Introduction to the basic concepts of public administration, including organizational theory, organizational authority and communications, personnel and financial administration, administrative responsibility in the public sector.

**HUMS 230. Health Insurance. 3 Hours.**

Basic concepts about the institutions, laws, and public policy dimensions of health care insurance in America with a focus on health and insurance, the payment network, comparative systems and alternate delivery, and public policy.

**HUMS 280. Grant Writing and Documentation. 3 Hours.**

Basic course providing students with the knowledge and skills necessary to write grants that are based upon clearly defined needs analysis and project goals. Researching possible funding sources identifying goals and objectives developing a program evaluation and time-line for a mock proposal will provide the students with real life grant writing experience.

**HUMS 290. Practicum Internship. 3-6 Hours.**

Observation, participation and hands-on experience in a suitable agency. The organization chosen for each individual will depend upon the occupational goals of the student. The selected facility will have a qualified administrator to enhance student learning opportunities. (150 work hours are minimum and more is recommended).

**HUMS 293. Special Topics. 1-6 Hours.**

PR:Consent. Investigation of topics not covered in regularly scheduled courses.

**HUMS 300. Introduction to Health Care Organizations. 3 Hours.**

An examination of the broad institutional and organizational components of the health care field with concentration on hospitals, nursing homes, health departments, and alternative delivery organizations. The role of both the physician and the health care manager in influencing the delivery of health care will be emphasized. Basic factors determining the cost and planning of health care will be considered.

**HUMS 320. Public Administration. 3 Hours.**

Concepts of public administration, including organizational theory, organizational authority and communications, personnel and financial administration, administrative responsibility in the public sector.

**HUMS 330. Health Insurance. 3 Hours.**

Institutions, laws, and public policy dimensions of health care insurance in America with a focus on health and insurance, the payment network, comparative systems and alternate delivery, and public policy.

**HUMS 340. Health Policy. 3 Hours.**

Examines how research, politics, and other social factors inform public health and healthcare policymaking processes. Students analyze complex policy problems facing federal, state, and local policymakers.

**HUMS 400. Health Services Law and Legislation. 3 Hours.**

Recognition and comprehension of areas of legal liability in hospital activities; knowledge and familiarity with a wide variety of administrative duties and responsibilities of a nature, such as administrative investigations, misconduct and line-of duty determinations, claims under the Medical Care Recovery Act, Federal Tort Claims Act, and other related matters.

**HUMS 410. Fundamentals of Health Care Administration. 3 Hours.**

Principles of modern health care administration, planning, organizing, directing, and controlling in health services management; contemporary issues in health care administration.

**HUMS 420. Principle of Microhealthcare Finance. 3 Hours.**

A critical study of healthcare finance at the department and sub-department level. The course will continue the study of financial information, decision making in the health care environment, processing mapping, capital and operational budgeting. Students will also be exposed to federal, state and local healthcare finance laws, rules and regulations.

**HUMS 421. Principles of Macrohealth Care Finance. 3 Hours.**

The nature of financial information and the decision making process in the health care industry; the financial environment in health care organizations; trends in reimbursement systems; cost concepts, financial analyses, capital formation and project analysis.

**HUMS 430. Medical Ethics. 3 Hours.**

Philosophical and sociological investigation of complex moral problems in medicine and healthcare delivery, topics include euthanasia, abortion, allocation of scarce medical responses, accessibility problems, AIDS, research and human experimentation, among others.

**HUMS 440. Long Term Care Administration. 3 Hours.**

PR:HUMS 300 or Consent. The purpose of this course is to acquaint students pursuing a career in health care management with the dynamic and increasingly important field of long term care. The course provides a comprehensive overview of programs, policies, and services and examines the issues, challenges and dilemmas confronting long term care management and others in the field of health services. Long term care includes; skilled nursing facilities, assisted living, home health care, adult day care (both the social and the medical models), hospice, and a view of continuous care retirement facilities.

**HUMS 460. Readings and Research in Health Services Administration. 1-3 Hours.**

Directed readings and research in health services administration.

**HUMS 470. Health Services Planning. 3 Hours.**

Introduction to the history and development of health planning; introductory overview of planning techniques and familiarity with general quantitative methodology; legal, political, and economic factors in health care planning with emphasis on policy formulation and implementation.

**HUMS 480. Grant Writing and Documentation. 3 Hours.**

Specialized course providing students with the knowledge and skills necessary to write grants that are based upon clearly defined needs analysis and project goals. Researching possible funding and sources, indentifying goals and objectives, developing a program evaluation and time-line for a mock proposal will provide the students with real-life grant writing experience.

**HUMS 489. Practicum Capstone Internship. 3-12 Hours.**

Observation, participation and hands-on experience in a suitable agency. The organization chosen for each individual will depend upon the occupational goals of the student. The selected facility will have a qualified administrator to enhance student learning opportunities. 75 work hours for each 3 hours of credit minimum and more is recommended.

**HUMS 493. Special Topics. 1-6 Hours.**

PR:Consent. Investigation of topics not covered in regularly scheduled courses.

**HUMS 494. Seminar. 1-3 Hours.**

PR:Consent. Presentation and discussion of topics of mutual concern to students and faculty.

**INDUSTRIAL TECHNOLOGY****INDT 212. Project Management. 3 Hours.**

PR: Consent. Topics include analysis and management of projects; planning, scheduling, staffing, and control; administration and procedures; cost estimating. Project management software will be used.

**INDT 302. Industrial Safety. 3 Hours.**

Topics covered in this course will include: manual handling and material storage; mechanical injuries; industrial environmental hazards - solvents, particulates, noise, radiation, toxicology, and ergonomics, etc.; monitoring instruments; protective devices industrial hygiene programs and safety practice in the use of basic hand and machine tools, with reference to OSHA, and other regulatory safety regulations.

**INDT 308. Automated Manufacturing. 3 Hours.**

PR:MATH 114 or Consent. Principles, techniques, and applications of Numerical Control CNC programming utilizing CAD/CAM, automated methods of material handling, manufacture, assembly, inspection/testing and material processing. Field trips may be included.

**INDT 352. Power and Transportation Technology. 4 Hours.**

Principles of operation and applicaiton of the generation, control, transmission, and utilization of power with emphasis on internal and external combustion engines; single machines and mechancial power transmission devices; fluid power; electrical theory and power; and transportation devices.

**INDT 354. Industrial Materials. 3 Hours.**

Introduction to types of materials-metals, ceramics, polymers, composites, and semiconductors; environmental degradation of materials, and material selection.

**INDT 356. CAD/CAM Systems. 3 Hours.**

PR:INDT 308. Utilization of skills developed in drafting and manufacturing courses to take advantage of Autocad LISP capability to build Numeric Control(NC) code directly from a CAD drawing. Students develop skills in the use of NC programmer software that can develop NC code and down-load through a post processor for operation of NC equipment. Various arrangements and applications of these systems are studied.

**INDT 360. Wood Technology. 3 Hours.**

The wood and wood products industries are adapted to the classroom and laboratory experiences. Emphasis on the development of process skills, manufacturing setup, and other basics of wood product manufacturing to include understanding wood and wood properties, methods of fabricarion, design, and future trends. Forest products, adhesives, lamination, and finishing.

**INDT 384. Robotics 1. 3 Hours.**

PR:Jr Status. Fundamental concepts of industrial robotics; manipulator control, sensor systems, microcomputer control schemes, robot goemetry and configuration, path control, multi-axis dynamics.

**INDT 410. Plant Equipment and Maintenance. 3 Hours.**

PR:MATH 113 and MATH 114 or Consent. A study of various manufacturing equipment, maintenance planning, scheduling, staffing, training, and resource management for maintenance requirements in industrial/educational facilities. Field trips may be included.

**INDT 413. Industrial Technology Practicum. 1-3 Hours.**

PR:Jr status and must be enrolled in a four-year technology program. Special assignment in industry to correlate with the Industrial Technology program. Students must have a designated industrial supervisor and a faculty coordinator. Final approval granted by student's department head.

**INDT 420. Construction Technology. 3 Hours.**

PR:INDT 354 or Consent. A broad coverage of current and standard methods of construction using wood, steel, masonry, and concrete. Requirements for energy efficiency of heating, plumbing and air conditioning are included. Emphasis is on residential, light commercial, and industrial construction.

**INDT 484. Robotics 2. 4 Hours.**

PR:INDT 384. Advanced concepts of industrial robots; survey of robotic components, systems and manufacturers, robot work areas, material logistics, implementation considerations, future robotic considerations.

**INDT 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## **INFORMATION SYSTEMS**

### **ISYS 101. Introduction to Information Systems 1. 3 Hours.**

An Introduction to the concepts of computer organization, system software, programming languages, computer security, networking, and database management. The other topics include history of computing, Boolean logic, and computer ethics.

### **ISYS 102. Introduction to Information Systems 2. 3 Hours.**

ISYS 102. Introduction to Information Systems 2. 3 hours. Introduction to the programming process, including program design tools, coding, and debugging. Design and implementation of programs and projects for business applications in Visual Basic.

### **ISYS 115. Discrete Structures. 3 Hours.**

ISYS 115. Discrete Structures. 3 hours. PR: MATH 150. An introduction to discrete mathematics as it is used in computer science. Topics include functions, relations, sets, propositional and predicate logic, simple circuit logic, proof techniques, elementary combinatorics, and discrete probability.

### **ISYS 270. Linux. 3 Hours.**

ISYS 270. Linux. 3 hours. PR: CS 122. An introduction to Linux programming, including shell scripting; the Linux file system; packaging software; process and thread creation; process and thread synchronization with semaphores and mutexes; interprocess communication with pipes; and programming sockets.

### **ISYS 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

### **ISYS 325. C#. 3 Hours.**

ISYS 325. C#. 3 hours. PR: C or better in CS 122. This course provides students with the necessary skills for developing applications using C# within Microsoft Visual Studio.NET environment focusing on object oriented design, program structure and implementation guidelines for developing applications.

### **ISYS 366. e-Commerce. 3 Hours.**

ISYS 366. e-Commerce. 3 hours. PR: CS 324 and ISYS 325. The essentials of design and creation of data driven e-commerce websites associated with complex databases. Upon completion, a student will have built a data driven commercial website similar to amazon.com in both ASP and php.

### **ISYS 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

### **ISYS 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

## **JOURNALISM**

### **JRL 495. Independent Study. 1-3 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## **MANAGEMENT**

### **MANG 310. Management of Small Business. 3 Hours.**

PR: BCOR 370. Focusing on the management of small business, the course is designed both for those seeking employment in small business, and for those entering large organizations which deal with small firms as suppliers, customers, and competitors.

### **MANG 330. Human Resource Management Fundamentals. 3 Hours.**

PR or CONC: BCOR 370. Fundamental principles and practices related to the procurement, development, maintenance, and utilization of human resources. Focus on areas such as human resource planning, selection training, performance appraisals, compensation, safety and health and labor relations.

### **MANG 350. Leadership In Business. 3 Hours.**

Investigation of human dimension in organization to include individual and group behaviors and organizational culture. Investigation and analysis of contemporary leadership thought and research as related to organizational operation.

### **MANG 360. International Business. 3 Hours.**

PR or CONC: BCOR 370. The course explores the cultural, economic, and political environments of business. Other topics include globalization, import and export, foreign direct investment, foreign currency exchange, regional economic cooperation, and the multinational enterprise.

### **MANG 371. Visual C#. 3 Hours.**

PR: MANG 370. Programming of web applications for business, employing Visual C#.Net syntax and data structures Visual Studio files and databases using ASP.NET for web publishing.

### **MANG 372. Advanced Web Page Design. 3 Hours.**

PR: BCOR 330 and MANG 371. Advanced concepts of Web Page design including; frames and hyperlinks behavior; objects and classes, data structures, database interactivity. VBA automation of MS Office applications: Access, Excel, and Word.

**MANG 375. Business Simulation. 3 Hours.**

PR:ACCT 331 and BCOR 350 and BCOR 370 and FIN 325. Business games that provide students with simulated real-world managerial decision-making experiences. The simulation provides students with the opportunities to make decisions that cross over functional lines.

**MANG 386. Business Statistics. 3 Hours.**

PR:MATH 124 and BCOR 370. Elementary principles of collecting and presenting statistical data; frequency distribution; grouping averages; dispersion and skewness; sampling processes; statistical inference; simple correlation; series analysis.

**MANG 420. Business Information Systems. 3 Hours.**

PR: BCOR 330 and BCOR 370. Use of EDP for decision making with emphasis on application in the functions of finance, marketing, personnel, accounting, and operations management.

**MANG 421. Business Information Systems Decisions. 3 Hours.**

PR:BCOR 330 and BCOR 370. Use of EDP for decision making with emphasis on application in the functions of finance, marketing, personnel, accounting, and operations management.

**MANG 422. The Individual and the Organization. 3 Hours.**

PR: BCOR 370. Examination of how the individual, the group, and the organization interact to influence the behavior of the business organization and that of its human resources.

**MANG 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 6 hours). Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**MANG 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**MARKETING****MKTG 315. Buyer Behavior. 3 Hours.**

PR: BCOR 350 with a minimum grade of C-. The buyer decision process in a marketing framework. Emphasis on psychological and sociological concepts which influence the decision process.

**MKTG 325. Marketing Research. 3 Hours.**

PR: BCOR 350 with a minimum grade of C-. Scientific approach to the solution of marketing problems with emphasis on research methods and techniques.

**MKTG 380. Integrated Promotions. 3 Hours.**

PR: BCOR 350 with a grade of C- or higher. Marketing promotions can dramatically influence the relative success of firms and their brands. As such, we seek to understand the processes and approaches that organizations use in developing and sustaining effective promotional strategies.

**MKTG 410. Retail Management. 3 Hours.**

PR: BCOR 350 and MKTG 315 with a grade of C- or higher in each. The organization and operating environment of retail firms. Special emphasis placed on consumer market segmentation and the marketing variables of merchandise mix, effective pricing, store location, and communication with suppliers and consumers.

**MKTG 420. Sales Management. 3 Hours.**

PR: MKTG 320 with a grade of C- or higher. Concentrates on the managerial responsibilities of sales manager for directing, motivating, and controlling a sales force plus the techniques of selling, including objections and closing.

**MKTG 485. Global Marketing. 3 Hours.**

PR: BCOR 350 with a minimum grade of C-. Evaluation and analysis of marketing strategies in a global environment, examination of the relationship between international buyer behavior and the elements of the marketing mix.

**MATHEMATICS****MATH 120. Basic Math 1. 3 Hours.**

PR:MATH 040 (with a grade of C or better) or a MATH ACT of 19 or higher and 1 unit of High School Algebra. Addition, subtraction, multiplication and division of whole numbers, fractions and decimals. Ratio and proportion, square roots and percent. Perimeters, areas and volumes of basic geometric shapes. Basic statistics; simple graphs; units; beginning algebra.

**MATH 121. Intro Concepts Of Mathematics. 3 Hours.**

(Designed for non-science majors who do not need the techniques of mathematics for other course work in their programs.) Topics in modern mathematics.

**MATH 122. Quantitative Skills and Reasoning. 2 Hours.**

An introductory study of quantitative and reasoning skills needed for success in science, technology, engineering, and mathematics.

**MATH 124. Algebra with Applications. 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, (prerequisites may vary on regional campuses). Study of algebra with an emphasis on applications for science, business, technology, and social science. Topics include graphing and solving problems using linear, quadratic, square-root, logarithmic, and exponential functions, solving equations, performing operations on matrices.

**MATH 124S. Algebra with Applications with Support. 3 Hours.**

PR: Satisfactory performance on departmental placement test, or satisfy the minimum ACT/SAT Math score, or a grade of C- or better in MATH 122. Study of algebra with an emphasis on applications for science, business, technology, and social science. Topics include graphing and solving problems using linear, quadratic, square-root, logarithmic, and exponential functions, solving equations, performing operations on matrices. Support topics will also include intermediate algebra remediation, how to study mathematics, decrease math/test anxiety, and manage your time.

**MATH 126. College Algebra. 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, (prerequisites may vary on regional campuses). Introduces the foundations of analysis designed to precede the calculus sequence with emphasis on functions and graphs. Topics include properties of absolute value, polynomial, rational, exponential, logarithmic functions, and techniques for solving equations and inequalities.

**MATH 126A. College Algebra 5-Day. 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, or C- in MATH 122. (This course is not open to students who have credit for MATH 129 or its equivalent.) Review of the real number system and algebraic expressions, equations, inequalities, graphing, functions, and polynomials. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 126B. College Algebra 4-Day. 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, or MATH 122 with a minimum grade of C-. (This course is not open to students who have credit for MATH 129 or its equivalent.) Review of the real number system and algebraic expressions, equations, inequalities, graphing, functions, and polynomials. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 126C. College Algebra 3-Day. 3 Hours.**

PR: Two units of algebra, one unit of geometry, and satisfactory performance on departmental placement examination or successful completion of the pre-college algebra workshop or its equivalent. (This course is not open to students who have credit for MATH 129 or its equivalent.) Review of the real number system and algebraic expressions, equations, inequalities, graphing, functions, and polynomials. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 126S. . 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, or a minimum grade of C- in MATH 122. Introduces the foundations of analysis designed to precede the calculus sequence with emphasis on functions and graphs. Topics include properties of absolute value, polynomial, rational, exponential, logarithmic functions, and techniques for solving equations and inequalities. Support topics will also include intermediate algebra remediation, how to study mathematics, decrease math/test anxiety, and manage your time.

**MATH 128. Plane Trigonometry. 3 Hours.**

PR: MATH 124 or MATH 126 with a minimum grade of C- in each. (This course is not open to students who have credit for MATH 129 or equivalent.) Trigonometric functions, identities, vectors, complex numbers, and trigonometric equations. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 129. Pre-Calculus Mathematics. 4 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement test. A treatment of algebra, analytic geometry, and trigonometry. Not open to students who have credit for the equivalent of either MATH 126 or 128. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 150. Applied Calculus. 3 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, or C- in MATH 124 or MATH 126 or MATH 129. For students in other disciplines needing calculus for applications. Limits of sequences and functions, continuity derivatives, and integrals of polynomials, rational functions, and exponential and logarithmic functions, partial derivatives, maxima and minima. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

**MATH 155. Calculus 1. 4 Hours.**

PR: Satisfy the minimum ACT/SAT math score, or satisfactory performance on departmental placement examination, or C- in MATH 129, For sections TOX offered at WVU Beckley, may instead satisfy minimum grade of C- in MATH 126 and MATH 128. Introduction to limits, continuity, derivatives, antiderivatives, definite integrals, and applications of the derivative. Not open to students who have earned credit in MATH 153 and/or MATH 154.

**MATH 156. Calculus 2. 4 Hours.**

PR: A minimum grade of C- in MATH 154 or MATH 155. Techniques of integration, application of the definite integral, polar coordinates, indeterminate forms, and infinite series.

**MATH 218. History of Mathematics. 3 Hours.**

PR: MATH 155 with a minimum grade of C-. Development of mathematics through calculus, with emphasis on mathematical theories and techniques of each period and their historical evolution. (Not offered on a regular basis.)

**MATH 251. Multivariable Calculus. 4 Hours.**

PR: MATH 156 with a minimum grade of C-. Introduction to solid analytic geometry, vector algebra, and calculus of several variables.

**MATH 261. Elementary Differential Equations. 4 Hours.**

PR: MATH 251, WVUIT sections require MATH 251 or MATH 315 with a minimum grade of B. Ordinary differential equations, Laplace transforms, partial differential equations, Fourier series, and applications.

**MATH 303. Introduction to the Concepts of Mathematics. 3 Hours.**

PR: MATH 156 with a minimum grade of C- or consent. Elementary logic, basic theory, relations and functions, equivalence relations and decomposition of sets, order relations, and cardinality. Emphasis on learning to prove statements and theorems.

**MATH 315. Advanced Technical Mathematics. 4 Hours.**

PR: MATH 155. This course may not be used as credit toward a math major or minor. Applications of integration to areas, volumes, centroids, and moments of inertia; differentiation and integration of trigonometric, logarithmic and exponential functions; methods of integration expansion of functions in series; elementary differential equations.

**MATH 341. Introduction to Algebraic Structures. 3 Hours.**

PR: MATH 283 or consent. A study of groups, rings, and fields together with their substructures, quotients and products, morphisms; the fundamental homomorphism theorems.

**MATH 378. Discrete Mathematics. 3 Hours.**

PR: MATH 283. Permutations, combinations, binomial theorem, inclusion-exclusion formula, recurrence relations, generating functions, elementary graph theory (connectivity, paths, circuits, trees, vertex and edge coloring, graph algorithms) matching theory, and discrete optimization. (Equiv. to CS 426.).

**MATH 381. Introduction to Analysis and Topology. 3 Hours.**

PR: MATH 283 or consent. Introduction to metric and topological spaces. Topics include: continuity, convergence, separation, compactness, and connectedness.

**MATH 420. Numerical Analysis 1. 3 Hours.**

PR: MATH 222 and MATH 251. Computer arithmetic, roots of equations, interpolation, Gaussian elimination, numerical integration and differentiation. Numerical solution of initial value problems for ordinary differential equations. Least square approximations.

**MATH 441. Applied Linear Algebra. 3 Hours.**

PR: MATH 251. Matrix algebra with emphasis on algorithmic techniques and applications to physical models. Topics include solution of large systems of equations, orthogonal projections and least squares, and eigenvalue problems.

**MATH 448. Probability and Statistics. 3 Hours.**

PR: MATH 251 or MATH 315 with a minimum grade of B. Samples spaces; probability, definition and elementary properties; random variables, expectation; special distributions; estimation; hypothesis testing; linear regression.

**MATH 451. Introduction to Real Analysis 1. 3 Hours.**

PR: MATH 283. A study of sequences, convergence, limits, continuity, definite integral, derivative, differentials, functional dependence, multiple integrals, sequences, and series of functions.

**MATH 452. Introduction to Real Analysis 2. 3 Hours.**

PR: MATH 451. A study of sequences, convergence, limits, continuity, definite integral, derivative, differentials, functional dependence, multiple integrals, sequences and series of functions.

**MATH 456. Complex Variables. 3 Hours.**

PR: MATH 261. Complex numbers, functions of a complex variable; analytic functions; the logarithm and related functions; power series; Laurent series and residues; conformal mapping and applications.

**MATH 496. Senior Thesis. 1-3 Hours.**

PR: Consent.

**MECHANICAL ENGINEERING****MAE 120. Drafting with Solid Modeling. 2 Hours.**

Fundamentals of drafting through the use of sketching and computer graphics as applied to orthographic views, sectional views, isometric views, and threads and fasteners.

**MAE 201. Applied Engineering Analysis. 3 Hours.**

PR: ENGR 111 and MATH 156. Overview of engineering analysis fundamentals Applied linear algebra and statistical analysis. Use of software such as spreadsheets, symbolic and analytic mathematical modeling packages, solid modeling packages, preparation of graphs of data and curve fitting.

**MAE 240. Manufacturing Processes. 3 Hours.**

PR: GPHS 120. An introduction to manufacturing systems and strategy. A study of manufacturing processes. Measurement and quality assurance, engineering materials; machining, welding and casting processes; hot and cold forming and joining processes, manufacturing and production systems, thermal treatments; equipment and process demonstration films. Lab involves student performed projects utilizing experience in operation of the various processes.

**MAE 241. Statics. 3 Hours.**

PR: WVU sections require PHYS 111 and (MATH 154 or MATH 155) all with a grade of C- or better, WVUIT sections require MATH 155 as a prerequisite. Engineering applications of force equilibrium. Vector operations, couples and moments, resultants, centers of gravity and pressure, static friction, free-body diagrams, trusses and frames.

**MAE 242. Dynamics. 3 Hours.**

PR: WVU sections require MATH 156 with a grade of C- or better and MAE 241, WVUIT sections require MATH 156 and MAE 241 as prerequisites. Newtonian dynamics of particles and rigid bodies. Engineering applications of equations of motion, work and energy, conservative forces, acceleration in several coordinate systems, relative motion, instantaneous centers, and plane motion.

**MAE 243. Mechanics of Materials. 3 Hours.**

PR: WVU sections require MATH 156 with a grade of C- or better and MAE 241, WVUIT sections require MATH 156 and MAE 241 as prerequisites. Stress deformation, and failure of solid bodies under the action of forces. Internal force resultants, stress, strain, Mohr's circle, and mechanical properties of materials, generalized Hooke's law. Axial bending and buckling loads, and combinations.

**MAE 311. Intermediate Mechatronics. 3 Hours.**

PR: ENGR 242 and MATH 156 and ELCE 220 or Consent. Circuits and electronics, sensors, and actuators. Analysis and synthesis of mechatronic systems, electromechanical system coupling, actuating devices, real time interfacing and case studies.

**MAE 320. Thermodynamics. 3 Hours.**

PR: WVU sections require PHYS 111 and MATH 156, WVUIT sections require MATH 156 as a prerequisite. Principles of thermodynamics; properties of ideal gases and vapors; first and second laws of thermodynamics; basic gas and vapor cycles; basic refrigeration.

**MAE 321. Applied Thermodynamics. 3 Hours.**

PR: MAE 320. Applications to mechanical systems of fundamentals from thermodynamics; availability analysis; applied gas and vapor power cycles; applied refrigeration and psychrometry; mixtures of real gases and vapors; combustion; choked flow nozzles. (3 hr. lec.)

**MAE 331. Fluid Mechanics. 3 Hours.**

PR: WVU sections require MATH 251 with a grade of C- or better and MAE 241, WVUIT sections require MATH 156 and MAE 242 as prerequisites. Properties of fluids, fluid statics, inviscid fluid dynamics, fluid kinematics, thermodynamic principles, mass momentum and energy principles, similitude and dimensional analysis, laminar and turbulent flow, viscous effects, flow in pressure conduits and external flows.

**MAE 332. Experimental Methods. 1 Hour.**

PR: MAE 334 and MAE 201 Methodology of experimental investigation; common properties of electrical, mechanical, thermal, and fluid systems, statistical analysis of data.

**MAE 333. Mechanical Measurements. 1 Hour.**

PR: MAE 332 and MAE 201. Laboratory measurements of physical quantities relevant to the mechanical engineering practice. Probability and statistical analysis of experimental data. Calibration of instruments. Sensors and transducers for temperature, pressure, strain, and fluid flow measurements. Technical report writing.

**MAE 334. Heat and Mass Transfer. 4 Hours.**

PR: CHE 202 or MAE 332. Steady-state and transient conduction; one-, two-, and three-dimensional conduction; free and forced convection radiation; heat exchangers; heat and mass transfer by analytical, numerical, analogical, and experimental methods.

**MAE 340. Vibrations. 3 Hours.**

PR: MATH 261 and ENGR 242. Reviews of linear algebra. Systems of one degree of freedom, undamped and damped; free and forced vibrations; transient and nonlinear vibrations; multi-degree of freedom systems with simulations by analog or digital computer.

**MAE 342. Dynamics of Machines. 3 Hours.**

PR: WVU sections require MAE 242 and PR or CONC: MATH 261, WVUIT sections require MAE 242 as a corequisite. Analysis of motion and forces in linkages and mechanisms. Synthesis of plane mechanisms, analysis of cams, gears and gear trains. Fundamentals of vibrations in machines. Analysis techniques include graphical, analytical and computational methods.

**MAE 405. Senior Mechanical Engineering Lab. 1 Hour.**

PR: MAE 335 and MAE 336 and MAE 201. Analysis and testing of selected thermal or mechanical systems, such as, turbines, fans, pumps, air conditioning, vibrations, and internal combustion engines, statistical analysis.

**MAE 407. Power Plant Engineering. 3 Hours.**

PR: MAE 334 and MAE 336 or consent. Fuels and combustion, steam generators, superheaters; reheaters; condensers, economizers; feedwater heaters; air preheaters, draft systems; introduction to nuclear power plant systems; aspects of environmental pollution, alternative energy systems including hydroelectric plants; field trips.

**MAE 410. Materials Science. 4 Hours.**

PR: CHEM 115 and ENGR 243 and Senior standing. Metals, microstructure, chemical composition, heat treatment, plastic deformation, fracture, fatigue, creep and wear; introduce preparation and microscopic examination of specimens; advanced materials testing.

**MAE 419. Heat Transfer Lab. 1 Hour.**

PR: MAE 320. This course will introduce students to various heat transfer processes such as conduction, convection, and heat exchangers. Using computer compatible equipment specially designed for educational purposes.

**MAE 423. Heat Transfer. 3 Hours.**

PR: WVU sections require MATH 261 with a grade of C- or better and MAE 320 and (MAE 331 or MAE 335), WVUIT sections require MAE 320 and MAE 321 as prerequisites and MAE 419 as a corequisite. One-, two-, three-dimensional steady state conduction: transient conduction; free and forced convection; radiation; heat exchangers; heat and mass transfer by analytical, numerical analogical and experimental methods; design of thermal systems.

**MAE 425. Internal Combustion Engines. 3 Hours.**

PR: WVU sections require MAE 320, WVUIT sections require MAE 321 as a prerequisite. IC engine operating characteristics; engine cycles; thermochemistry and fuels; air and fuel induction; fluid motion within combustion chamber; combustion; exhaust flow; emissions and air pollution; heat transfer in engines; friction and lubrication; advanced engine concepts.

**MAE 427. Heating, Ventilating, and Air Conditioning. 3 Hours.**

PR: WVU sections require MAE 320 or consent, WVUIT sections require MAE 321 and MAE 423 as prerequisites or department consent. Air and humidity relations; comfort and indoor air quality; building heat transfer; design heating and cooling loads; air distribution; refrigeration; systems and equipment; system energy analysis; control systems.

**MAE 428. Aerodynamics. 3 Hours.**

PR: ENGR 331 and MAE 334 Bernoulli's equation; dimensional analysis; potential flow analysis; lift analysis; compressible flow through nozzles; shock wave analysis; boundary layer effects; experimental testing in subsonic and supersonic flows.

**MAE 429. Theory of Turbomachines. 3 Hours.**

PR: MAE 334 and ENGR 331. Dimensional analysis; energy transfer between a fluid and a rotor; thermodynamics of gas flow; flow of fluid in turbomachines; centrifugal pumps and compressors; radial flow turbines; axial flow turbines; performance of compressors and pumps and comparison of types.

**MAE 440. Industrial Hydraulics: Components and Circuits Design. 3 Hours.**

PR: ENGR 243 and ENGR 331 or Consent. Basic laws of fluid power. Fluids and auxiliaries. Energy input, energy control and energy output devices. Hydraulic circuits, symbology, operation, analysis and design practices. Component selection and performance analysis.

**MAE 445. Computer Applications in Engineering. 3 Hours.**

PR: ENGR 111 and MATH 251. Use of spreadsheets for engineering applications. Graphics, drawing and plotting packages. Mathematical packages for equation solving and symbolic algebra. Overview of MATHCAD, MAPLE, MATLAB, 3-D solid modeling using I-DEAS and AUTODESK INVENTOR, computational fluid dynamics modeling, visualization and post-processing.

**MAE 449. Experimental Stress Analysis. 3 Hours.**

PR: MAE 404. Mechanical, optical, electrical, grid, Moire fringe and brittle coating methods; strain gauge circuitry; photoelasticity; strain indicators; recorders, reflection and circular polariscopes.

**MAE 454. Machine Design and Manufacturing. 3 Hours.**

PR: WVU sections require MATH 261 with a grade of C- or better and MAE 342 and MAE 343, WVUIT sections require MAE 243 as a prerequisite and MAE 342 as a corequisite. Working stresses, theories of failure, fatigue, welded joints, design of machine elements such as shafting, screws, springs, belts, clutches, brakes, gears, bearings, and miscellaneous machine elements. Design for manufacturability considerations.

**MAE 455. Computer Aided Drafting and Design. 3 Hours.**

PR: MAE 201 and MAE 304 and Senior status or Consent. Computer-aided design fundamentals. Use of graphics capabilities of the microcomputer for engineering design and simulation. Exposure to commercial CAD and motion simulation packages. 2-D and 3-D computer drafting. Solid modeling applications. A preparatory course for finite element method.

**MAE 456. Computer-Aided Design and Finite Element Analysis. 3 Hours.**

PR: WVU sections require MATH 261 with a grade of C- or better and MAE 343 and (MAE 342 or MAE 345), WVUIT sections require MATH 251 and MAE 454 and MAE 455 as prerequisites and MAE 423 as a corequisite. Computer aided design fundamentals and formulation of the stiffness matrix and load vector 1D and 2D elements based on variational principles. Analytical and finite element solution of vibration and heat transfer problems. Explore applications of CAD/FEM packages in design case studies.

**MAE 460. Automatic Controls. 3 Hours.**

PR: WVU sections require MATH 261 with a grade of C- or better, WVUIT sections require EE 221 and MATH 261. Modeling and simulation of mechanical systems using transfer functions. 1st and 2nd order systems with associated specification. Block algebra and concept of Equivalent Transfer Function. Steady state errors. Routh-Hurwitz criteria for stability. Root locus based design of proportional controllers and compensators. Introduction to state variables modeling.

**MAE 463. Advanced Machine Design. 3 Hours.**

PR: MAE 404 and MAE 201. Theories of failure in 2-D and 3-D stress systems. Fatigue failure modes and their analysis. Fatigue life estimation techniques. Plasticity of metals and applications Creep behavior of engineering materials. Shock, wear, corrosion, and other modes of failure. Thermal stresses.

**MAE 464. Mechanical Engineering Projects. 1-4 Hours.**

PR: Jr or Sr standing. An investigation of analytical or experimental nature; design, construction and testing of an experimental apparatus.

**MAE 468. Advanced Vibrations. 3 Hours.**

PR: MAE 340. Three-dimensional kinematics and kinetics of particles and rigid bodies. Lagrangian mechanics; Hamiltonian methods; equations of motion for strings, membranes, prismatical bars and plates for various boundary conditions; approximate methods for complicated shapes.

**MAE 480. System Design 1. 3 Hours.**

PR: MAE 404 one semester before graduation. Professional ethics, the role of engineer in society, professionalism and current issues in engineering. Systems design applied to a project; lectures cover morphology of design, the design processes, decision and optimization techniques, and computer aided design. Begin a design project to be completed in MAE 481.

**MAE 481. Systems Design 2. 3 Hours.**

PR:MAE 480. A semester long design project in which students normally work in teams Formal report required at the end of the semester.

**MAE 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

## **MILITARY SCIENCE**

**MILS 101. Military Science. 2 Hours.**

The organization and development of the U.S. Army and ROTC from its inception to the present. The structure and role of the U.S. defense establishment with emphasis on the broad range of America civil-military relations.

**MILS 102. Military Science. 2 Hours.**

**MILS 103. Leadership Laboratory 1. 1 Hour.**

Open only to (and required of) students in the associated Military Science course. This laboratory course is designed to offer the student an opportunity for integration and application of training management and leadership skills. Team academic alignment. Course includes confidence building exercises such as rappelling, group presentations, basic marksmanship, and drill and ceremonies.

**MILS 185. Basic Conditioning and Fitness. 1 Hour.**

Open to all students, but required of students enrolled in MILS -201 and 202. Students participate in and learn to lead a physical fitness program. Emphasis is on the development of an individual fitness program and the role of exercise and fitness in one's life. Leadership positions are tailored based on the student's academic alignment.

**MILS 200. Practicum in Military Training and Tactics. 2 Hours.**

Introduction to individual and team aspects of military tactics in small unit operations. The class compares the actions of small organizations in the process of developing strategy, and tactics, while taking into account theory, political, economic, and physical factors. Continues development of leadership and critical skills. The Military Science Lab (MILS-203) and participation in our physical fitness (MILS 203) and participation in our physical fitness (MILS-199, 299) courses are required in conjunction with this class. Participation in a weekend field training exercise is optional but highly encouraged. Prerequisite: MILS 101 and MILS 102 and prior military training, permission of the instructor.

**MILS 201. Military Science. 2 Hours.**

Introduction to basic leadership and management with emphasis on the fundamental concepts and skills required of today's citizen-soldier.

**MILS 202. Military Science. 2 Hours.**

Continued instruction in basic fundamentals of leadership and management, with emphasis on the military application of these fundamentals. Introduction to small unit tactics and organization.

**MILS 203. Leadership Laboratory. 1 Hour.**

Open only to (and required of) students in the associated Military Science course (101, 102, 201, 202). This laboratory course is designed to offer the student an opportunity for integration and application of training management and leadership skills. Team members and leadership positions are tailored based on the students' academic alignment. Course includes confidence building exercises such as rapelling, group presentations, basic marksmanship, and drill and ceremonies.

**MILS 210. Camp Challenge. 6 Hours.**

A six-week summer camp conducted at an Army post. The student receives pay. Travel lodging and most meal cost are defrayed by the Army. The environment is rigorous and is similar to Army basic training. No military obligation incurred. Open only to students who have not taken all four of MILS 101, 102, 201 and 202, and who pass a physical examination (paid for by ROTC). Completion of MILS 210 qualifies a student for entry into the advanced course. Three different training cycles are offered during the summer, but spaces are limited by the army. Candidates can apply for a space any time during the school year prior to the summer. Studenta are eligible to compete for ROTC scholarships during the summer camp. The advanced cours consists of the courses MILS 301, 302, 310, 401 and 402. It is open only to students who have completed the Basic course or earned placement credit for it The advanced course is designed to qualify a student for a commission as an officer in the United States Army. Students must complete MILS 310, a six-week advanced camp during the summer, usually between the junior and senior years. The courses must be taken in sequence unless other wise approved by the Professor of Military Science. Students receive \$150 per month during the school year.

**MILS 285. Basic Conditioning and Fitness. 1 Hour.**

Open to all students, but required of students enrolled in MILS 201 and 202. Students participate in and learn to lead a physical fitness program. Emphasis is on the development of an individual fitness program and the role of exercise and fitness in one's life. Leadership positions are tailored based on the student's academic alignment.

**MILS 301. Military Science. 3 Hours.**

PR: Basic course or equiv. (Equivalent credit may be granted by the WVU Director of Admissions and the professor of military science on the basis of prior military services, or ROTC training other than courses in military science taken at WVU.) Examines the requirements for military training and the psychological and technical aspects of effective instruction. Additionally, the military career system and the occupational specialties options available are reviewed.

**MILS 302. Military Science. 3 Hours.****MILS 303. Leading Small Organizations 1. 2 Hours.**

Series of practical opportunities to lead small groups, receive personal assessments and encouragement, and lead again in situations of increasing complexity. Uses small unit defensive tactics and opportunities to plan and conduct training for lower division students both to develop skills and as vehicles for practicing leading. The military science leadership lab (MILS 303) plus participation in the advanced physical fitness course are required in conjunction with this class. Participation in one weekend field training exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MILS 304. Leading Small Organizations 2. 2 Hours.**

Continues methodology of MILS 301. Analyze tasks; prepare written or oral guidance for team members to accomplish tasks. Delegate tasks and supervise. Plan for and adapt to the unexpected in organizations under stress. Examine and apply lessons from leadership case studies. Examine importance of ethical decision making in setting a positive climate that enhances team performance. The military science leadership lab, MILS 303, plus participation in the advanced physical fitness course are required in conjunction with this class. Participation in one weekend field training exercise is required; two other weekend exercises optional.

**MILS 305. Advanced Course Leadership Laboratories. 1 Hour.**

Open only to students in the associated military science course. Different leadership roles are designed for students at different levels in the program. Involves leadership responsibilities for the planning, coordination, execution and evaluation of various training and activities with basic course students and for the ROTC program as a whole. Students develop, practice and refine leadership skills by serving and being evaluated in a variety of responsible positions.

**MILS 310. ROTC Advanced Camp. 6 Hours.**

A six-week camp conducted at an Army post. Only open to (and required of) students who have completed MILS 301 and 302. The student receives pay. Travel, lodging and most meal costs are defrayed by the U.S. Army. The advanced camp environment is highly structured and demanding, stressing leadership at small unit levels under varying, challenging conditions. Individual leadership and basic skills performance are evaluated throughout the camp. Although this course is graded on a Pass/Fail basis only, the leadership and skills evaluated at the camp weigh heavily in the subsequent selection process that determines the type commission and job opportunities given to the student upon graduation from ROTC and the university.

**MILS 385. Advanced Physical Fitness and Conditioning. 1 Hour.**

Only offered to (and required of) students in MILS 301, 302, 401 and 402. Students will participate in and learn to plan and lead physical fitness programs. Develops the physical fitness required of an officer in the Army. Emphasis on the development of an individual fitness program and the role of exercise and fitness in one's life.

**MILS 401. Military Science. 3 Hours.**

PR: MILS 301 and MILS 302 or consent. Stresses the responsibilities of an officer and affords leadership experience as a cadet leader. Military staff procedures, military law, and military organizations, which prepare the student for future services, are studied.

**MILS 402. Military Science. 3 Hours.**

PR: MILS 401 or consent. Advanced leadership techniques, unit operations, and personnel management problems are discussed in seminars. The military role in United States foreign policy and world affairs is examined.

**MILS 403. Leadership Challenges and Goal Setting. 2 Hours.**

Plan, conduct and evaluate activities of the ROTC cadet organization. Articulate goals and put plans into action to attain them. Assess organizational cohesion and develop strategies to improve it. Develop confidence in skills to lead people and manage resources. Learn/apply various Army policies and programs in this effort. The military science leadership lab, (MILS 403), plus participation in the advanced physical fitness course are required in conjunction with this class. Participation in one weekend field training exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MILS 404. Transition to Lieutenant. 2 Hours.**

Continues the methodology from MILS 401. Identify and resolve ethical dilemmas. Refine counseling and motivating techniques. Examines aspects of tradition and law as relate to leading as an officer in the Army. Prepare for future as a successful Army lieutenant. The military leadership lab (MILS 403), plus participation in the advanced physical fitness course are required in conjunction with this class. Participation in one weekend field training exercise is also required, and one or two more weekend exercises may be offered for optional participation.

**MILS 405. Advanced Course Leadership Laboratories. 1 Hour.**

Open only to students in the associated military science course. Different leadership roles are designed for students at different levels in the program. Involves leadership responsibilities for the planning, coordination, execution and evaluation of various training and activities with basic course students and for the ROTC program as a whole. Students develop, practice and refine leadership skills by serving and being evaluated in a variety of responsible positions.

**MILS 485. Advanced Physical Fitness and Conditioning. 1 Hour.**

Only offered to (and required of) students in MILS 301, 301, 401, 402. Students will participate in and learn to plan and lead physical fitness programs. Develops the physical fitness required of an officer in the Army. Emphasis on the development of an individual fitness program and the role of exercise and fitness in one's life.

**MILS 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**MILS 494. Seminar. 1-3 Hours.**

PR: Consent. Presentation and discussion of topics of mutual concern to students and faculty.

## **MULTIDISCIPLINARY STUDIES**

**MDS 199. Orientation to MDS. 1-2 Hours.**

Orientation to degree programs and requirements, departmental resources, curriculum options, student responsibilities and opportunities.

**MDS 330. Regents Portfolio Design. 3 Hours.**

The purpose of this course is to provide and guide adults in assembling and documenting their life and work experiences that they believe equates to college level learning into a successful, defensible master portfolio that can launch course/ department petitions.

**MDS 485. Interdisciplinary Studies Senior Project. 3-4 Hours.**

Design and completion of Interdisciplinary Project. Requires approval of faculty committee.

**MDS 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## **MUSIC**

**MUSC 110. Fundamentals of Music. 3 Hours.**

(Not open to music majors.) Introductory course designed to develop music reading skills through a systematic presentation of music notation and elementary compositional projects.

**MUSC 111. Introduction to Music. 3 Hours.**

Introductory course designed to develop an appreciation and understanding of the significance of music and to help the student develop intelligent listening habits.

**MUSC 113. American Popular Music. 3 Hours.**

Introduction of history and development of American popular music.

**MUSC 115. Introduction to History of Jazz. 3 Hours.**

An Introduction to jazz, its characteristics, important performers, and their music, including an historical survey with attention to the changing style of the music.

**MUSC 116. Music in World Cultures. 3 Hours.**

Examination of music from various cultures (e.g. Native America, South India, Japan, Africa) within their cultural contexts.

**MUSC 120. History of Musical Theatre. 3 Hours.**

This course explores American musical theatre, one of this country's primary contributions to world culture, covering its origins, components, and its major creative figures.

**MUSC 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**MUSC 312. WVU Tech Singers. 1 Hour.**

PR: Consent. Sing choral music with emphasis on pops music. Members are invited to sing by the conductor. Previous vocal and/or choral experience is recommended.

## **NURSING**

**NSG 100. Introduction to Nursing. 2 Hours.**

Introduction to the role of the nurse in modern health care: critical thinking, nursing interventions, professionalism, caring and communication in nursing practice with emphasis on safety, quality, health, culture, ethics, leadership, and health policy.

**NSG 211. Health Assessment & Communication. 6 Hours.**

PR: NSG 100 with a minimum grade of C-. Examination of concepts, principles, and models that guide nursing practice related to physical, psychosocial, spiritual, developmental, cultural, intellectual assessment and communication across the lifespan in the classroom, simulation, and various clinical settings.

**NSG 212. Foundations of Nursing Practice. 6 Hours.**

PR: NSG 211 with a minimum grade of C-. Theories, concepts, principles, and processes that lay the foundation for critical thinking, nursing interventions, communication, professional role and caring in the practice of nursing. Application of the nursing process in classroom, simulation, and clinical experiences.

**NSG 250. Clinical Nursing Pharmacology. 3 Hours.**

PR: NSG 211 with a minimum grade of C-. Principles of pharmacology emphasizing scholarly inquiry and evidence-based reasoning to insure accurate knowledge of and administration of medications to individuals and families across the lifespan. Pharmacological management is analyzed in conjunction with pathophysiology.

**NSG 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**NSG 310. Maternal Infant Nursing & Women's Health Care. 4 Hours.**

PR: NSG 212 and PR or CONC: NSG 311 and NSG 376 with a minimum grade of C-. Human response to normal and abnormal changes in health status across the female lifespan and adaptations of the childbearing family. Provision of the holistic nursing care to women and childbearing families in the clinical area.

**NSG 311. Alterations in Adult Health 1. 6 Hours.**

PR: NSG 212 and PR or CONC: NSG 376 with a minimum grade of C- in each. Pathophysiology and holistic nursing care of adults experiencing acute and chronic problems. Use of the nursing process to plan and provide interventions appropriate to health care needs in the clinical setting.

**NSG 312. Alterations in Adult Health 2. 6 Hours.**

PR: NSG 311 and NSG 376 with a minimum grade of C- in each. Builds on NSG 311 using critical thinking and nursing process in a team based learning format, paired with clinical application, to explore holistic nursing care of adults with acute and chronic health problems.

**NSG 320. Child and Adolescent Health. 4 Hours.**

PR: NSG 311 and NSG 376 with a minimum grade of C- in each. Didactic and clinical experiences focused on human response to alterations in health, developmental needs, and family-centered care specific to pediatric population with emphasis on the professional nursing role, evidence-based reasoning, therapeutic communications, and caring.

**NSG 333. Ethics in Nursing. 3 Hours.**

PR: ENGL 102 with a minimum grade of C-. Ethical issues and decision making in nursing and health care situations across the lifespan. Emphasizes professional writing skills.

**NSG 350. Evidence Based Practice and Research. 3 Hours.**

PR: NSG 211 and NSG 212 and (STAT 201 or STAT 211) with a minimum grade of C- in each. Theory, concepts, and methods of the research process intended to provide a basic understanding that is necessary for the translation of current evidence into nursing practice.

**NSG 360. Ethics and Health Policy. 3 Hours.**

PR: NSG 212 and ENGL 102 with a minimum grade of C- in each. Ethical decision-making in health care situations across the lifespan, including palliative and end of life care. Health care policy, legal and regulatory issues are discussed.

**NSG 361. Health Assessment. 3 Hours.**

Holistic health assessment of individuals and families across the lifespan, including physical, psychosocial, spiritual, and developmental assessment.

**NSG 411. Nursing in Complex Community Systems. 7 Hours.**

PR: NSG 276 and NSG 310 and NSG 312 and NSG 320 and NSG 360 with a minimum grade of C- in each. Comprehensive theoretical introduction to community health nursing paired with clinical experience focused on promoting health and preventing disease in multiple populations. Culminates in a capstone project that addresses an identified community health need.

**NSG 412. Leadership in Complex Systems. 7 Hours.**

PR: (NSG 312 and NSG 360 and NSG 450) with a minimum grade of C- in all. Development of leadership and management skills necessary for professional nursing practice and interventions supporting multiple patients in acute-care complex systems. Classroom experiences paired with 225 hours of precepted leadership experience.

**NSG 433. Seminar 8: Professional Role Synthesis. 3 Hours.**

PR: NSG 343. Emphasis is on implementation of the professional nursing role within a changing health care system. Focuses on analysis of societal, institutional and economic factors that affect the delivery of health care.

**NSG 435. Cardiology for Nursing. 2 Hours.**

PR: Junior or Senior standing in BSN Program. Introduction to the interpretation and treatment of cardiac arrhythmias.

**NSG 450. Alterations in Mental Health. 4 Hours.**

PR: NSG 310 and NSG 312 and NSG 320 and NSG 360 with a minimum grade of C- in each. Theory and Practice of professional nursing in response to complex alterations in psychosocial function and their impact on individuals, families, and communities. Classroom and clinical experiences.

**NSG 460. Care of the Critically Ill Patient. 4 Hours.**

PR: NSG 312 and NSG 411 and NSG 450 with a minimum grade of C- in each. Focuses on the professional nursing role in supporting individuals and families experiencing complex physiological alterations in health. Paired with clinical experiences supporting individuals and families in critical care settings.

**NSG 478. The Role of the Nurse in the Patient Experience. 2 Hours.**

PR: NSG 212 with a minimum grade of C-. Didactic experience focused on exploring the nurse's role in the patient's and family's healthcare experience.

**NSG 480. Core Concepts in Gerontological Nursing. 2 Hours.**

PR: NSG 211 and NSG 212 with a minimum grade of C- in each and Junior or Senior standing. Examination of patient specific concepts, nursing assessments, interventions, and models of care that guide nursing practice related to holistic care of the older adult.

**NSG 481. Cardiac Nursing. 2 Hours.**

PR: NSG juniors and seniors. Introduction to the interpretation and treatment of cardiac arrhythmias.

**NSG 482. Palliative Care Nursing. 2 Hours.**

Focus is on the care of patients with chronic non-curable conditions across the life span. The course analyzes the definition of palliative care and defines the role of hospice as a part of palliative care. Cultural sensitivity and communication with palliative care patients and their families is emphasized.

**NSG 484. Care of the Diabetic Patient. 2 Hours.**

PR: Consent. In-depth analysis of nursing care of the patient with diabetes.

**NSG 485. Children With Complex Health Needs. 2 Hours.**

PR: NSG 320 with a minimum grade of C-. The nursing care of children with complex acute and chronic health problems with a focus on decision-making using a case study problem based learning approach.

**NSG 486. NCLEX Review. 1 Hour.**

PR:Senior status. Focuses on achievement of professional success by preparing for RN licensure. Preparation for NCLEX will be the focus of this by enhancing NCLEX testing skills.

## **PHYSICAL EDUCATION**

**PE 100. Lifetime Activities. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Health and physical education concepts includes carry over skills and techniques in a broad and varied list of elective activities.

**PE 104. Intermediate Basketball. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to intermediate knowledge and skills in basketball.

**PE 110. Military Physical Conditioning. 1 Hour.**

(May be repeated for a maximum of 2 credit hours).

**PE 124. Fitness Walking. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). This course provides a supervised walking program in a safe, enjoyable environment. Classes meet ACSM guidelines for safe, effective classes. Includes warm-up, cardiovascular segment, cool-down, and stretch.

**PE 130. Flag Football. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in flag football.

**PE 157. Slow Pitch Softball. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in slow pitch softball.

**PE 159. Soccer. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in soccer.

**PE 161. Tennis. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to basic knowledge and skills for people who are familiar with tennis.

**PE 164. Weight Training. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in weight training.

**PE 165. Conditioning. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in conditioning.

**PE 170. Volleyball. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in volleyball.

**PE 174. Intermediate Swimming. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to intermediate knowledge and skills in swimming.

**PE 175. Lifeguard Training. 2 Hours.**

(May be repeated for a maximum of 2 credit hours). Red Cross certification for lifeguards.

**PE 176. Advanced Swimming. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to advanced knowledge and skills in swimming.

**PE 179. Orientation to Scuba. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). Introduction to beginning knowledge and skills in scuba diving.

**PE 187. Golf. 1 Hour.**

(May be repeated for a maximum of 2 credit hours). The course is designed to introduce students to the rules, skills, and strategies involved in golf.

**PE 220. Striking and Field Games. 1 Hour.**

This teaching games for understanding (TGfU) course is designed to introduce the students to the rules, skills, and strategies involved in playing striking and fielding games.

**PE 221. Invasion Games. 1 Hour.**

This teaching games for understanding(TGfU) course is designed to introduce the students to the rules, skills, and strategies involved in playing games where one invades their opponent's territory.

**PE 223. Net and Wall Games. 1 Hour.**

This teaching games for understanding (TGfU) course is designed to introduce the students to the rules, skills, and strategies involved in playing net and wall games.

## PHYSICAL EDUCATION/TEACHING

### **PET 124. Human Body: Structure and Function. 2 Hours.**

Overview of the structure and function of the organ systems in the human body. Topics covered include the skeletal, muscular, nervous, digestive, respiratory, and cardiovascular systems.

### **PET 125. Principles of Human Movement. 2 Hours.**

PR: PET 124. This course is designed to introduce prospective physical educators to the principles of human movement. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

### **PET 175. Motor Development. 2 Hours.**

To examine changes in human movement behavior across the lifespan, the processes that underline these changes, and the factors that contribute to those changes.

### **PET 244. Motor Learning and Performance. 2 Hours.**

Introduction to principles related to teaching, learning, and performance of motor skills. Emphasizes the application of knowledge to teaching and learning strategies for motor-skill acquisition.

### **PET 324. Water Safety Instructorships. 2 Hours.**

PR: Senior Lifesaving Certification. Teaching methods in swimming and water safety. Meet American Red Cross certification standards. Course completion carries eligibility for teaching swimming, lifesaving, and water safety.

## PHYSICAL SCIENCE

### **PHSC 101. Introductory Physical Science 1. 4 Hours.**

Current theories and concepts of physical science; fundamental laws and concepts of physics, chemistry, astronomy, and geology.

### **PHSC 102. Introductory Physical Science 2. 4 Hours.**

PR: PHSC 101. This course covers topics and concepts in electricity, atomic structure, chemistry, astronomy, and geology.

### **PHSC 311. Astronomy. 3 Hours.**

PR: MATH 124. Current theories and concepts of astronomy; structure and composition of solar system; formation, structure, and evolution of stars; structure, composition, and motion of the Milky Way and other galaxies; structure and evolution of the Universe.

## PHYSICS

### **PHYS 101. Introductory Physics. 4 Hours.**

PR or CONC: MATH 128 or MATH 129 or MATH 150 or MATH 153 or MATH 154 or MATH 155 or MATH 156 or consent or satisfactory performance on MATH departmental placement exam. The fundamental philosophy and principles of physics are applied to studies of mechanics, sound, heat, and thermodynamics through demonstrations, problems, and experiments. Pre-requisites and/or co-requisites may differ on regional campuses.

### **PHYS 102. Introductory Physics. 4 Hours.**

PR: PHYS 101. The fundamental philosophy and principles of physics are applied to studies of electricity, magnetism, optics, light, and atomic and nuclear physics through demonstrations, problems, and experiments. Pre-requisite(s) and/or co-requisite(s) may differ on regional campuses.

### **PHYS 111. General Physics. 4 Hours.**

PR: MATH 155 with a grade of C or better or (MATH 153 with a grade of C or better and PR or CONC: MATH 154). Survey of classical mechanics, thermodynamics and waves.

### **PHYS 112. General Physics. 4 Hours.**

PR: PHYS 111. Survey of electricity, magnetism, and optics.

### **PHYS 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

### **PHYS 314. Introductory Modern Physics. 4 Hours.**

PR: PHYS 112 and MATH 156. Topics of modern physics of interest to science majors and engineers; atomic and molecular structure and spectra, solid state and nuclear physics, relativity, and elementary particles.

### **PHYS 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

## POLITICAL SCIENCE

### **POLS 102. Introduction to American Government. 3 Hours.**

General survey of American national government and politics.

### **POLS 103. Global Political Issues. 3 Hours.**

Analysis of issues in post-cold war international politics, ranging from traditional major power diplomacy and intervention to the newer problems of economic interdependence and development, human rights, population pressures on limited resources, and the environment.

### **POLS 220. State and Local Government. 3 Hours.**

The legal basis, structure, politics and operation of state and local governments, in the content of the American federal system.

**POLS 239. Introduction to Non-Profit Organization. 3 Hours.**

An examination of the broad institutional and organizational components of non-profit organizations.

**POLS 260. Introduction to International Relations. 3 Hours.**

Theories and concepts in international politics and their application to contemporary world politics.

**POLS 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**POLS 309. State and Local Government. 3 Hours.**

Origins, background, comparisons, and contrasts of state governments; state and federal relations; state executive, legislative, and judicial branches; state services; county and municipal governments.

**POLS 311. Political Parties & Elections. 3 Hours.**

Parties and elections in America; emphasis on nomination and general election processes, campaigns, the mass media, campaign finance, voting, the electoral college, and parties in government.

**POLS 313. American Constitutional Law. 3 Hours.**

The role of the Constitution in the American political system. Topics include the political concept of constitutionalism; the role of the Supreme Court in the political process; division of powers among the three branches of government; and the constitutional relation between the national government and the states.

**POLS 319. Comparative Government. 3 Hours.**

Comparison of governmental systems in Europe, Asia, Latin America, and Africa. Select countries in each region will be studied with regard to their political institutions and SOCI- economic systems.

**POLS 400. Terrorism and National Security. 3 Hours.**

Basic overview of terrorism tactics and national security initiatives.

**POLS 480. Seminar in Non-Profit Administration. 3 Hours.**

Special Topics in the area of non-profit administration and current problems.

**POLS 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

## **PSYCHOLOGY**

**PSYC 101. Introduction to Psychology. 3 Hours.**

Survey of general psychology.

**PSYC 201. Psychology as a Profession. 1 Hour.**

PR: PSYC 101. Orientation to opportunities for experience, employment, and graduate and professional training in psychology.

**PSYC 202. Research Methods in Psychology. 3 Hours.**

PR: PSYC 101 and (STAT 201 or STAT 211). Research methods in experimental, developmental, clinical, and community-social psychology in the laboratory and the natural environment.

**PSYC 203. Research Methods & Analysis 1. 3 Hours.**

PR: PSYC 101 with a minimum grade of C- and (MATH 124 or higher with a minimum grade of D-; or MATH ACT 26; or pre-2016 MATH SAT 590, or post-2016 MATH SAT 610, or ALEKS score of 65). Research methods and data analysis utilizing descriptive and correlational designs in developmental, experimental, clinical, and social psychology in the laboratory and the natural environment.

**PSYC 204. Research Methods & Analysis 2. 3 Hours.**

PR: PSYC 203 with a minimum grade of C-. Research methods and data analysis utilizing experimental and quasi-experimental designs in developmental, experimental, clinical, and social psychology in the laboratory and the natural environment.

**PSYC 234. Drugs and Behavior. 3 Hours.**

PR: PSYC 101. Behavioral, neurochemical, pharmacological, historical, legal, social, and clinical aspects of commonly used and abused psychoactive drugs.

**PSYC 241. Introduction to Human Development. 3 Hours.**

PR: PSYC 101. Survey of human psychological development across the life span with emphasis on change in biological, cognitive, and social-emotional processes. Special attention given to theoretical, conceptual, methodological, and practical issues.

**PSYC 281. Introduction to Abnormal Psychology. 3 Hours.**

PR: PSYC 101. Introduction to major categories of behavior disorders; etiology, prevention and treatment.

**PSYC 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**PSYC 301. Biological Foundations of Behavior. 4 Hours.**

PR: PSYC 101 and (PSYC 204 or BIOL 219 and BIOL 220). Introduction to animal behavior. Survey of fundamental concepts (evolution, genetics, adaptation, and learning) and research methods in understanding animal behavior including primate species. Includes laboratory exercises and demonstrations.

**PSYC 302. Behavior Principles. 4 Hours.**

PR: PSYC 101 and (PSYC 202 or PSYC 204 for Psychology majors) or (BIOL 302 or STAT 312 for Neuroscience majors). Principles of behavior and learning and the significance of these principles for psychological theory and application; laboratory exercises and demonstrations.

**PSYC 331. History and Systems of Psychology. 3 Hours.**

PR: PSYC 202 or PSYC 203 or PSYC 204 or PSYC 231 or PSYC 232 or PSYC 241 or PSYC 251 or PSYC 293 and at least junior or senior standing. A survey of psychology from its origins in philosophy, biology, and physics through the early major schools of psychological thought to modern perspectives on the science of behavior and its applications to human affairs.

**PSYC 343. Child and Adolescent Development. 3 Hours.**

PR: PSYC 241 and junior or senior standing. Theory and research on major psychological processes in childhood and adolescence; maturation, personality, socialization, sensory, and cognitive development.

**PSYC 350. Topics in Social Psychology. 3 Hours.**

Social factors that determine human behavior, survey of research in selected areas of social psychology and their implications for social phenomena.

**PSYC 351. Topics in Social Psychology. 3 Hours.**

PR: PSYC 251 and junior or senior standing. Social factors that determine human behavior, survey of research in selected areas of social psychology and their implications for social phenomena.

**PSYC 362. Psychological Assessment. 3 Hours.**

PR: PSYC 202 or PSYC 204 and at least junior standing. Psychometric theory and development of psychological assessment instruments. Includes behavioral, personality, intellectual, neuropsychological, forensic, achievement, and aptitude assessment.

**PSYC 363. Personality Theory. 3 Hours.**

PR: PSYC 202 or PSYC 204 and at least junior standing. Theoretical and empirical readings in a survey of major perspectives in personality theory, including dynamic, cognitive, humanistic, and behavioral.

**PSYC 365. Forensic Psychology. 3 Hours.**

PR: PSYC 101 and junior or senior standing. Surveys role of psychology in the legal system. Issues addressed include: insanity, child custody, sexual abuse, police fitness, eye witness and jury selection.

**PSYC 382. Exceptional Children. 3 Hours.**

PR: PSYC 241 and junior or senior standing. Exceptional mental retardation or advancement; organic disabilities having behavioral consequences, such as cerebral palsy or deafness; and behavior disorders.

**PSYC 401. Psychology Capstone Experience. 1 Hour.**

PR: PSYC 101 and PSYC 201 and STAT 211 and senior standing. Experience in coursework, research, or service that integrates knowledge gained as a major in psychology. To be taken concurrently with capstone experience, details of which are to be determined in consultation with advisor.

**PSYC 424. Learning and Behavior Theory. 3 Hours.**

PR: PSYC 302 and junior or senior standing. Advanced course in empirical and theoretical issues in the psychology of learning.

**PSYC 474. Applied Behavior Analysis. 3 Hours.**

PR: PSYC 302 and junior or senior standing. The application of basic learning principles to changes in socially significant human behavior.

**PSYC 490. Teaching Practicum. 1-3 Hours.**

PR: Consent. Teaching practice as a tutor or assistant.

**PSYC 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experimental learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

**PSYC 493. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**PSYC 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regularly scheduled courses.

**RECREATION, PARKS, AND TOURISM****RPTR 148. Wilderness First Responder. 3 Hours.**

PR: Consent. This course provides training necessary to become certified in dealing with various aspects and levels of outdoor/ wilderness crises for forestry, recreation, or any outdoor professionals. (Grading will be pass/fail.).

**RPTR 242. Environmental and Cultural Interpretation. 3 Hours.**

This course is about people, communication and natural resource management. It focuses on theory and application of communication methods for natural resource settings and topics, including communication of technical information to lay publics.

**RPTR 251. Leadership in Experiential Education. 3 Hours.**

This course focuses on elements of leadership in outdoor and experiential education and provides students with hands-on learning opportunities.

**RPTR 325. Challenge Course Facilitation. 3 Hours.**

This course involves learning the background philosophies, theories, and structures that have led to development of the challenge course industry. Students will also learn the basic skill necessary to safely facilitate a group.

**RPTR 326. Canopy Tour Facilitation. 3 Hours.**

Exposes the student to the skills and knowledge necessary to act as a canopy tour guide including: risk management, operations, technique, facilitation, and an overview of the industry. Successful completion of the course will qualify the student to take the Association for Challenge Course Technology (ACCT) Level 1 Practitioner Certification Exam.

## **SOCIOLOGY**

**SOCA 101. Introduction to Sociology. 3 Hours.**

Basic course intended to develop a perspective about the nature of social processes and the structure of society.

**SOCA 105. Introduction to Anthropology. 3 Hours.**

Essentials of human evolution and prehistory with a concentration on the varieties of languages and cultures found among peoples of the world.

**SOCA 207. Social Problems in Contemporary America. 3 Hours.**

Sociological analysis of the causes, effects and approaches to preventing and reducing social problems in American society.

**SOCA 221. Families and Society. 3 Hours.**

Historical comparative approach to changing structure and functions of the family institution. Effect of economic, demographic, and cultural changes on relationships, gender roles, marriage, childcare; variations by socioeconomic status, race, ethnicity, gender, sexual orientation.

**SOCA 230. World Religions. 3 Hours.**

Introduction to major religious traditions of the world. Through lectures, speakers, assigned readings, field trips, and occasional videos students will gain a broad basis knowledge of the major religions.

**SOCA 232. Criminology. 3 Hours.**

PR: SOCA 101. Exploration of various theories of criminal behavior; emphasis on a critical study of the criminal justice system and efforts to reform the penal system.

**SOCA 235. Race and Ethnic Relations. 3 Hours.**

Racial and ethnic groups are examined in terms of their history, transformation over time, and the contemporary conditions and issues they face. Emphasis is on prejudice as well as systemic racism.

**SOCA 293. Special Topics. 1-6 Hours.**

PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**SOCA 302. Deviant Behavior. 3 Hours.**

PR: SOCA 232 and (SOCA 234 or CJ 101) or consent. Examination of the processes by which deviance is defined in society, and the methods of social control attempted. Provides a critical understanding of society from the perspective of those defined as outsiders-criminals, addicts, etc.

**SOCA 305. Social Stratification Social and Power in American Society. 3 Hours.**

PR:SOCA 101 or Consent. The course will focus on patterns of wealth, prestige, and power in American society. The contemporary configuration of class will be analyzed in the light of historical patterns as well as future developments. The impact of class status on the individual and psychological patterns of class behavior will be studied. Philosophic arguments regarding the ethics of inequality will be considered.

**SOCA 311. Social Research Methods. 3 Hours.**

PR: SOCA 101 and (STAT 201 or STAT 211 or ECON 225). Logic of social research, elements of research design, and problems of measurement, with emphasis on survey research methodology and data analysis.

**SOCA 312. Death and Dying. 3 Hours.**

This course explains the issues and problems associated with death in American society. Topics such as changing attitudes, grief, funeral practices, life after death, the dying patient, and widowhood are presented from a variety of perspectives.

**SOCA 324. Gender and Crime. 3 Hours.**

PR: SOCA 232 and (SOCA 234 or CJ 101). Builds on basic sociological principles and concepts, and focuses on issues of social structure and process that are at the intersection of gender crime, and crime control.

**SOCA 325. Illness and Health Care. 3 Hours.**

An overview of behavioral factors relating to occurrence of and response to illness, with particular emphasis upon American medicine. Designed especially for students interested in health-related careers.

**SOCA 326. Social Problems. 3 Hours.**

PR:SOCA 101 or consent. Survey of major problems of individuals, groups, man's relationship to the environment and international problems; analysis of programs of solution and social control.

**SOCA 327. Appalachian Culture. 3 Hours.**

Overview of Appalachian culture and development from settlement to the present. The course draws on the folk culture, culture of poverty, regional development, and colonial models to offer perspectives on Appalachian cultural diversity, problems, power relationships, and development.

**SOCA 333. Sociology of Work and Work Places. 3 Hours.**

PR: SOCA 101 or consent. Explores the significance of work and work relations in contemporary society. Emphasis is given to the analysis of employment settings including industrial organizations.

**SOCA 360. Women and Men in Society. 3 Hours.**

PR: SOCA 101 or WGST 170. Sociological study of gender stratification. Emphasis on social, structural, historical, cultural bases of gender relations. Structured around issues of theoretical debate and research interest concerning U.S. gender system. Includes cross-cultural and international comparisons.

**SOCA 430. World Religions. 3 Hours.**

Study of the major religious traditions of the world. Through specialized lectures, speakers, assigned readings, field trips, and occasional videos students will gain a broad basis knowledge of the major religions.

**SOCA 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**SOCA 497. Research. 1-6 Hours.**

Independent research projects.

**SPANISH****SPAN 101. Elementary Spanish 1. 3 Hours.**

PR: Score of S1 on placement test or no prior study of the language or departmental consent. Introduction to the sound and writing systems of the language with emphasis on listening, speaking, reading and writing within an authentic cultural context. (Course presumes no prior knowledge of the language.)

**SPAN 102. Elementary Spanish 2. 3 Hours.**

PR: SPAN 101 or score of S2 on placement exam. Continuation of SPAN 101. Introduction to the sound and writing systems of the language with emphasis on listening, speaking, reading, and writing within an authentic cultural context.

**SPAN 203. Intermediate Spanish 1. 3 Hours.**

PR: SPAN 102 or score of S3 on placement exam. Continuation of SPAN 102.

**SPAN 204. Intermediate Spanish 2. 3 Hours.**

PR: SPAN 203 or score of S4 on placement exam. Foundation for advanced study of Spanish. Emphasis on oral and written communication.

**SPAN 495. Independent Study. 1-6 Hours.**

Faculty supervised study of topics not available through regular course offerings.

**SPORT AND EXERCISE PHYSIOLOGY****SEP 271. Sport in American Society. 3 Hours.**

Sociocultural investigation of sport in American society.

**SEP 272. Psychological Perspectives of Sport. 3 Hours.**

An examination of personality and behavioral factors as they affect participation in sport. Topics such as stress and sport, body image, aggression and the sport participant, and the licensure of sport psychologists highlight the course.

**SPORT MANAGEMENT****SM 167. Introduction to Sport Management. 3 Hours.**

Overview of the sport management profession including career opportunities, critical current issues, trends, professional standards and the professional organizations.

**SM 275. The Olympic Games. 3 Hours.**

An examination of the historical development of the Olympic Games from the Greek classic period (500 B.C.) to the games of the XXVI Olympiad of Atlanta in 1996.

**SM 340. Sport Governance. 3 Hours.**

This course examines how sport organizations interact and coordinate with numerous policy actors to facilitate and coordinate the mechanisms of governance.

**SM 345. Technology in Sport Management. 2 Hours.**

PR: Majors only. This course provides an understanding of the technological concepts and principles relevant to sport management and provides student with practical experiences in the use of emerging technologies in the field.

**SM 350. Leadership in Sport Management. 2 Hours.**

PR: Majors only. The purpose of this course is to identify the fundamental leadership behaviors in sport management. This course provides sport management students the opportunity to explore current leadership theories and practices in sport.

**SM 355. Orientation in Sport Management. 1 Hour.**

PR: Majors only. In this course students will identify and develop the skill sets necessary for successful completion of an internship in sport management.

**SM 370. Sport Finance and Economics. 3 Hours.**

The purpose of this course is to provide financial and economic overview of professional, collegiate and recreational sports. Students will learn financial structures of sport organizations and various economic principles applied to the sport industry.

**SM 375. Sport in the Global Market. 3 Hours.**

An examination of the role of sports within the broader process of globalization. Its impact on culture, politics, economics and how these influences shape today's sport.

**SM 380. History and Philosophy of Sport. 3 Hours.**

This course is designed to acquaint students with philosophical issues related to sport and sport management and with individuals and events that helped shape the history of sport.

**SM 387. Issues in Sport Studies. 3 Hours.**

PR: ENGL 102. An in-depth analysis of critical issues impacting sport and the sport industry.

**SM 425. Sport Facility and Event Management. 3 Hours.**

PR: Consent. This course is designed to inform students of the principles and practice of planning, funding, and managing of sport facilities and event management.

**SM 426. Liability in Sport. 3 Hours.**

An overview of the legal system as it applies to sport, including contracts, tort law, drug testing, types of athletes, product liability, and legal duties of coaches, facilities supervisors, and athletic directors.

**SM 485. Sport Management. 3 Hours.**

PR: Senior standing. The study of management principles as they relate to sport organizations. The analysis includes specific references to planning, organizing, leading and evaluating functions of management in sport.

**SM 486. Sport Marketing & Sales. 3 Hours.**

The study of marketing principles as they relate to sport organizations. Specific attention is focused on the marketing planning process, marketing informational systems, and internal marketing.

**SM 491. Professional Field Experience. 1-18 Hours.**

PR: Consent. (May be repeated up to a maximum of 18 hours.) Prearranged experiential learning program, to be planned, supervised, and evaluated for credit by faculty and field supervisors. Involves temporary placement with public or private enterprise for professional competence development.

## STATISTICS

**STAT 210. Statistics for the Health Sciences. 3 Hours.**

PR: MATH 124 or MATH 125 or MATH 113 or MATH 126 and Consent. This course may not be used as credit toward a math major or minor. Statistical inference, selecting appropriate statistical methods for data sets, interpreting results from commonly used statistical tests, evaluating reported statistical analysis in medical and health care literature, statistical calculations, interpreting SAS and SPSS output from commonly used procedures.

**STAT 211. Elementary Statistical Inference. 3 Hours.**

PR: WVU and PSC sections require MATH 122 with a minimum grade of C- or MATH 124 or higher, or appropriate Math ACT or Math SAT scores, or satisfactory placement on the Mathematics placement test, Tech sections require MATH 124 or higher, or advanced placement. Basic concepts of descriptive and inferential statistics: descriptive measures, random variables, sampling distributions, estimation, tests of hypotheses, chi-square tests, regression and correlation. (Not open to students who have completed STAT 215.)

## WOMEN AND GENDER STUDIES

**WGST 225. Women in Appalachia. 3 Hours.**

Use variety of sources to explore how race, class, ethnicity, sex and gender impact lives of diverse Appalachian women, including portrayal of women, stereotypes, impact of stereotypes, and how women construct their own identities.

## WV UNIVERSITY EXPERIENCE

**WVUE 191. First Year Seminar. 1-3 Hours.**

Exploration of academic experiences through meaningful contexts. The course will envelope a range of academic components needed to achieve student success and successfully transition to West Virginia University.

**WVUE 270. Effective Public Speaking. 3 Hours.**

Designed for improvement of the student's speech based upon theory and demonstrated performance of voice and diction skills and public-speaking skills for effective communication in a variety of speaking situations.