Technical Studies

Associate in Applied Science Degree

The focus of this program is to provide a vehicle for alternately trained professionals to attain their educational goals by awarding credit for those training, internship, apprenticeship and other educational experiences that can be adequately evaluated and measured.

For more information, visit the Department of Information Technologies (http://www.ccm.edu/academics/divdep/bmet/department-of-information-technologies/) website.

Degrees

AAS Technical Studies

(P3510)

General Education Foundation		
Communication		6
ENG-111	English Composition I	
ENG-112	English Composition II	
Math-Science-Technology [2]		3
Social Science		3
SOC-120	Principles of Sociology	
General Education Electives		9
Humanities Elective 1		
Science Elective		
PSY-113	General Psychology	
General Education Foundation Credits		21
Technical Studies Core		
Select from one of the following concentrations: [1]		39
Computer Information Systems		
Digital Media Technology		
Telecommunications		
Electronic Technology		
Mechanical Technology		
Electro/Mechanical Technology		
Fire Science Technology		
Technical Studies Core Credits		39
Total Credits		**60**

Three to 25 Technical Studies elective credits may be earned for corporate, industrial or military training programs after review by faculty assessor of related program.

[1] *Individuals must select at least four courses in one of the concentrations listed below to satisfy the Technical Studies credit requirements.*

[2] Individuals should pick math course from the following restricted Math courses: MAT 110, MAT 124 or MAT 130

Select from one of the following concentrations:

Computer Information Systems		
CMP-120	Foundations of Information Security	
CMP-124	Network Security	
CMP-125	Information Security Management	
CMP-126	Computer Technology and Applications	
CMP-128	Computer Science I	
CMP-129	Computer Science II	
CMP-130	Introduction to Information Technology	
CMP-135	Computer Concepts With Applications	
CMP-160	Digital Forensics I	
CMP-170	Mobile App Design	
CMP-200	Computer Operating Systems and Utilities	
CMP-207	Electronic Spreadsheets (MS Excel)	
CMP-230	Computer Architecture and Assembly Language	
CMP-233	Data Structures and Algorithms	
CMP-237	Visual Basic (VB.Net)	
CMP-239	The Internet and Web Page Design	
CMP-241	Database Programming (SQL)	
CMP-243	Ethical Hacking and Systems Defense	
CMP-246	Operating Systems	
CMP-261	Digital Forensics II	
CMP-271	Mobile App Programming	
CMP-280	Software Engineering	
Computer Information Systems Credits		0
Digital Media Technology		
MED-110	Multimedia I	
MED-113	Multimedia II	
MED-119	Digital Media Production	
MED-210	Digital Video Editing	
MED-213	Multimedia Authoring and Design	
MED-220	Animation	
MED-240	Advanced Animation	
COM-114	Media Aesthetics	
CMP-108	Game Design Concepts	
CMP-126	Computer Technology and Applications	
CMP-239	The Internet and Web Page Design	
CMP-244	Web Design II	
CMP-245	Web Design Tools	
CMP-250	Game Production	
Digital Media Technology Credits		0
Telecommunications		
TEL-107	Computers and Data Networks	
TEL-110	Routing I	
TEL-120	Routing II (CISCO)	
TEL-220	Routing III (CISCO CCNA3 & CCNA4)	
TEL-233	Network Operating Systems	
ELT-110	Digital Principles	

ELT-209	Advanced Digital and Microprocessors	
CMP-128	Computer Science I	
Telecommunications Credits		0

Electronic Technology

ELT-110	Digital Principles	
ELT-115	Active Circuit Components	
ELT-201	Electricity and Electronics	
ELT-213	Active Circuit Design	
ELT-215	Industrial Electronics	
ELT-231	Electronic Communication Systems	
ENR-132	Introduction to Experimentation and Design	
CMP-128	Computer Science I	
TEL-110	Routing I	
Electronic Technology Credits		0

Mechanical Technolgoy

ENR-117	Computer-Aided Drafting I	
ENR-118	Computer-Aided Drafting II	
ENR-132	Introduction to Experimentation and Design	
MAT-113	Applied Calculus	
MEC-104	Statics	
MEC-141	Strength of Materials for Engineering Technology	
MEC-155	Mechanical Components	
MEC-236	Machine Design	
Mechanical Technolgoy Credits		0

Electro/Mechanical Technology

ELT-110	Digital Principles	
ELT-201	Electricity and Electronics	
ELT-210	Electronic Fabrication	
ENR-117	Computer-Aided Drafting I	
ENR-132	Introduction to Experimentation and Design	
MEC-110	Materials for Engineering Technology	
MEC-141	Strength of Materials for Engineering Technology	
MEC-155	Mechanical Components	
MEC-236	Machine Design	
TEL-110	Routing I	
Electro/Mechanical Technology Credits		0

Fire Science Technology

FST-101	Introduction to Fire Science	
FST-102	Fire Prevention and Related Codes	
FST-201	Fire Service Management	
FST-202	Hazardous Materials	
FST-204	Fire Protection, Building Construction	
FST-210	Current Issues in Fire Science/ Capstone Experience	
Diversity/Global Perspective (3 Credits)		
FST or CJS (restricted elective 16 credits)		
Fire Science Technology Credits		0

Age-of-Credit Policy: Technology-based courses taken by a student at least seven years prior to the time the student applies for graduation may not be applied to a degree or certificate within the Department of Information Technologies.

Courses

CMP-000. Technology Literacy Test. 0 Credits.
LECT hrs
Technology Literacy Test.

CMP-101. Computer Information Literacy. 1 Credit.
LAB 30 hrs
This general education course provides students with an introduction to basic computer concepts that include learning the fundamentals of Windows, accessing the Internet and using Microsoft Word. Not for Information Technologies Department majors.
Additional Fees: Course fee applies.

CMP-108. Game Design Concepts. 3 Credits.
LECT 45 hrs
This course provides the student with an introduction to fundamental game design concepts. The range of topics includes game worlds and settings, character creation, storytelling, game audio, game art and animation, gameplay and user interface design. In addition, the history of the game industry, social impact and the future of gaming are discussed. Students analyze various games and genres and create their own game design document.
Additional Fees: Course fee applies.

CMP-120. Foundations of Information Security. 3 Credits.
LECT 45 hrs
This course provides a principled introduction to the field of information security. History, characteristics and models of information and computer security are explored. Topics such as risk management, logical and physical security, continuity, cryptography, and architecture are discussed. The National Centers of Academic Excellence in Cyber Defense Education Knowledge Units and the CISSP CBK domains are incorporated into the course content affording the student reinforcement and mastery of information security terminology and concepts.
Additional Fees: Course fee applies.

CMP-124. Network Security. 3 Credits.
LECT 45 hrs
This course provides an in-depth study of network attack techniques and methods to defend against them. Areas of study include communication security, infrastructure security, cryptography, and operational and organizational security as it relates to network hardware, software and data. Topics include authentication, attacks, virtual private networks, email protection, web security, wireless, firewalls, intrusion detection, cryptography, disaster recovery and computer forensics regarding networked systems. Using a hands-on approach, powerful tools to diagnose and correct security breaches are investigated and manipulated. This course is mapped to the National Centers of Academic Excellence in Cyber Defense Education Knowledge Units and vendor-neutral certification exam.
Additional Fees: Course fee applies.

CMP-125. Information Security Management. 3 Credits.
LECT 45 hrs
This course entails identifying an organization's information assets and the development, documentation and implementation of policies, standards, procedures and guidelines that ensure confidentiality, integrity and availability of those assets. This course, which is mapped to the National Centers of Academic Excellence in Cyber Defense Education Knowledge Units, prepares students to understand the planning, organization and roles of individuals involved in security, to develop security policies, and to utilize management tools to identify threats, classify assets and rate vulnerabilities. A detailed, real-world security plan is developed using customized strategies.
Additional Fees: Course fee applies.

CMP-126. Computer Technology and Applications. 4 Credits.
LECT 45 hrs LAB 30 hrs
This general education course teaches: (1) basic computer-use concepts such as hardware and peripherals, file organization and management, and operating system use; (2) Internet use, browsers and search engines; (3) software applications including word processing, spreadsheet, electronic slideshow presentations, database use and calendaring; (4) netiquette, ethics and copyright policies; (5) downloading and installing software and plug-ins; (6) communications technologies including email, blogs and Web technologies; (7) personal computer and information security; and (8) career exploration, job search strategies and portfolio development. Students are required to complete a series of laboratory assignments that illustrate skills and use technologies in the areas listed including a cross-applications/technologies project. Not for Information Technologies Department majors. Students will not receive credit towards graduation for more than one of the following courses: CMP-126, CMP-135, or BUS-119.
Additional Fees: Course fee applies.

CMP-128. Computer Science I. 3 Credits.
LECT 30 hrs LAB 30 hrs
In this introductory course, students obtain fundamental computer science knowledge and develop programming skills using an object-oriented approach, incorporating security awareness,human-computer interactions and social responsibility. This course provides students with a basic foundation in computing history, computing careers, computer organization, operating system responsibilities, software development process, algorithm design and analysis, programming paradigms, and human interaction design.
Prerequisites: MAT-007 or equivalent
Additional Fees: Course fee applies.

CMP-129. Computer Science II. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course is the second in a three-course sequence that provides students with a foundation in Computer Science. Students develop intermediate-level programming skills using an object-oriented approach with an emphasis on software development, fundamental algorithms and data structures, software assurance, and ethical conduct.
Prerequisites: CMP-128 (grade of C or better) or equivalent
Additional Fees: Course fee applies.

CMP-130. Introduction to Information Technology. 3 Credits.
LECT 30 hrs LAB 30 hrs
This is the introductory course in the field of study of Information Technology. This course introduces the student to the software and hardware found in today's computing environment and the basic skills and tools required to install, support, and upgrade common information technology used by businesses, organizations and academic institutions. This is one of three courses that helps the student prepare for the CompTIA A+ certification examination. In addition, the basics of network architecture, database management, information security and web infrastructure are covered. At completion, the student will be prepared for further study in the curriculum of Information Technology and equipped with the fundamental knowledge required of an IT Professional. The students use popular desktop applications to organize and perform IT laboratory activities.
Additional Fees: Course fee applies.

CMP-131. Fundamentals of Programming (Python). 3 Credits.
LECT 30 hrs LAB 30 hrs
This is a fundamental course in problem solving and programming. This course introduces concepts such as how to solve problems by designing and implementing algorithms using a popular programming language. Topics include: pseudocode, algorithms, variables, constants, using decisions and loop structures to construct effective code, using built-in functions, creating functions and modules, and simple debugging techniques for detecting errors. Use of real-world problems in Web Development, Cybersecurity and Data Science are explored. No prior programming experience is required.
Additional Fees: Course fee applies.

CMP-135. Computer Concepts With Applications. 3 Credits.
LECT 30 hrs LAB 30 hrs
This general education course is designed to provide familiarity with current software for word processing, spreadsheet, presentation and database applications. An introduction to web browsers, computer and information security, social impact of computing, concepts in computer hardware, and application and system software is also included. Students are required to complete a series of laboratory assignments that illustrate skills in using the above software applications. Students must allocate time to complete assignments using the same software (available on campus). Not for Computer Information Systems majors. Students will not receive credit towards graduation for more than one of the following courses: CMP-135, CMP-126 or BUS-119.
Additional Fees: Course fee applies.

CMP-149. Critical Game Play. 3 Credits.
LECT 30 hrs LAB 30 hrs
This is an introductory course designed to increase games literacy and foster a shared understanding of the history of games, culturally and aesthetically. A thorough knowledge of the games that have shaped this industry is integral for all students considering entering the field. The class covers a wide spectrum of digital and analogue games. Students will take part in discussions and lectures.They will compose a short analyses of different games and justify their stances in group-wide presentations. The primary activity of the class is critical play - playing games and analyzing them in order to better understand the medium on a personal and professional level.
Additional Fees: Course fee applies.

CMP-150. Game Programming. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course covers fundamental game programming techniques using an industry-standard scripting language. Students learn how to use a popular game engine to build game programs. Topics include sprites, animation, collisions, timers, game state variables, player input, audio, user interface design and storyboarding. Laboratory work includes several game element programming exercises,leading up to a final game project.
Prerequisites: CMP-128 or equivalent
Additional Fees: Course fee applies.

CMP-160. Digital Forensics I. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course introduces the student to the fundamental concepts of computer forensics. By conducting a detailed examination of data media for structure, file system type, volumes, lost and hidden areas, the student will develop the ability to collect and analyze computer data for digital evidence. An understanding of specific resources and an exploration of software tools available for data recovery and forensic analysis will be conducted in a laboratory setting. Upon completion of this coursed the student will demonstrate various data recovery techniques as the basis for forensic evaluation.
Additional Fees: Course fee applies.

CMP-200. Computer Operating Systems and Utilities. 3 Credits.
LECT 45 hrs LAB 15 hrs
This introductory course provides essential concepts related to operating systems, particularly within the Microsoft ecosystem. Students navigate various aspects of operating systems and manage files and folders, and develop analytical skills to troubleshoot hardware problems using dedicated tools such as the Hardware manager.
Additional Fees: Course fee applies.

CMP-230. Computer Architecture and Assembly Language. 3 Credits.
LECT 45 hrs LAB 15 hrs
This course is an introduction to computer architecture and assembly language programming. Topics covered include digital logic and data representation, computer architecture and organization, interfacing and input/output strategies, memory architecture, functional organization, and multiprocessing. Students are exposed to basic assembly language programming techniques in laboratory assignments.
Prerequisites: CMP-128 or equivalent
Additional Fees: Course fee applies.

CMP-233. Data Structures and Algorithms. 3 Credits.
LECT 45 hrs LAB 15 hrs
The course includes advanced computer science topics dealing with logical structures of data and the design and analysis of computer algorithms operating on these structures. The course concentrates on abstract data structures (ADTs) such as lists, queues, stacks, hash tables, dictionaries, and trees. Both iterative and recursive algorithms are explored with analysis of their efficiency for these ADTs. Problems and computer exercises implementing the above structures and techniques are assigned.
Prerequisites: CMP-129 or equivalent and MAT-123 or higher
Additional Fees: Course fee applies.

CMP-239. The Internet and Web Page Design. 3 Credits.
LECT 45 hrs LAB 15 hrs
This course introduces students to the design and development of static, front-end websites using current markup language and styling standards. Fundamental structures and multi-media content are addressed, along with responsive design, accessibility guidelines and Search Engine Optimization (SEO). Also, considered is the history, architecture and societal impacts of the Internet. Students will use their creativity to construct a professional-quality, multi-page website in a semester-long project, which will be stored in an online portfolio. No prior programming experience is required.
Additional Fees: Course fee applies.

CMP-241. Database Programming (SQL). 3 Credits.
LECT 45 hrs LAB 15 hrs
This course uses the rules and syntax of an "industrial-strength" database programming language that can be used on all types of computers. Topics include relational database aspects, data input and validation, creation and maintenance of files, query, user control center, and application generator. Emphasis is on development of programs related to business database applications.
Prerequisites: CMP-128 or CMP-131 or permission of department chair
Additional Fees: Course fee applies.

CMP-243. Ethical Hacking and Systems Defense. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course combines an ethical methodology with the hands-on application of security tools, techniques, and methodologies in performing computer system and network security vulnerability - risk analyses - to better help students secure and defend their systems. Topics to be covered include internal and external penetration tests, risk analysis methodology, and security audits. Students are introduced to common countermeasures that effectively reduce and/or mitigate attacks. This class is designed to help students prepare for professional careers in the information security field and the Certified Ethical Hacker (CEH) certification exam.
Prerequisites: CMP-124
Additional Fees: Course fee applies.

CMP-244. Web Design II. 3 Credits.
LECT 45 hrs LAB 15 hrs
This is an intermediate front-end web design and development course with a strong focus on incorporating dynamic content, such as animation, that is interactive and user engaging through the introduction of modern scripting languages and frameworks. Students will gain experience with web server and hosting technology for publishing website projects live on the Internet. Using their prior course final project as a baseline for their own growth potential in the course students will design and develop a new semester-long multi-page website that demonstrates marked improvement in design skills while incorporating the dynamic skills learned throughout the course.
Prerequisites: CMP-239
Additional Fees: Course fee applies.

CMP-249. Advanced Web Programming. 3 Credits.
LECT 30 hrs LAB 30 hrs
This advanced course in Web Development introduces the student to creating interactive and dynamic Websites using current Web programming. Building on concepts and principles of computer programming and scripting languages, students will interact with Web server technologies and develop front end, advanced professional Websites with fully functioning back end support.
Prerequisites: CMP-128 and CMP-244
Additional Fees: Course fee applies.

CMP-250. Game Production. 3 Credits.
LECT 30 hrs LAB 30 hrs
Working in teams, students combine their game design and programming skills to explore the practical challenges of managing the development of games. Industry-standard software and advanced programming are used in this capstone course to develop a functioning game of the highest professional quality. Emphasis is placed on the game design document, storyboarding, the game production process, user interface and game design, interactive storytelling, character development, 3D animation, special effects, audio, the collaborative process, and usability testing.
Prerequisites: CMP-150 or MED-220
Additional Fees: Course fee applies.

CMP-255. Linux. 4 Credits.
LECT 45 hrs LAB 30 hrs
This is a hands-on course in the administration of a Linux Operating System. Students utilize the command line interface to control the operating system and its utilities. Focus is placed on the file system, user system, file security, process and job management, X-Windows, shells and shell scripting. A POSIX-compliant shell, such as ash, dash, bash or ksh, is introduced. Concepts include redirection, piping, and regular expressions. Upon successful completion of this course, students are proficient in using the Linux operating system, with combined lecture and lab exercises focusing on basic/intermediate skills essential to an IT professional.
Prerequisites: CMP-128
Additional Fees: Course fee applies.

CMP-262. Data Science Programming. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course covers problem solving strategies and programming techniques specific to data analytics using an industry-standard, general-purpose programming language and tool set. Students will learn how to gather input from structured and unstructured sources of various formats, stored locally and remotely through cloud computing, and use programming libraries and application programming interfaces to efficiently process data and present information. Team and individual projects will analyze real-world, large datasets. Data integrity, privacy and security will be considered.
Prerequisites: CMP-131 Fundamentals of Programming (Python) or approval of IT Department Chairperson
Additional Fees: Course fee applies.

CMP-263. Web Development Workflow. 4 Credits.
LECT 45 hrs LAB 30 hrs
This course provides students with cutting edge Web development skills to create and maintain Web sites that are modern, responsive, and dynamically delivered across a wide range of devices. Students learn leading Web design and development tools including current industry standard Web interactive tools, Git, JQuery Framework, and content management systems. Instruction and practice on available platforms provide seamless integration and unified interface across all tools to streamline Web development from local development to staging to production. Students will develop competence in the use of industry-leading development tools in building a current, engaging, and dynamic Web site.
Prerequisites: CMP-239 or MED-110 or GRD-108
Additional Fees: Course fee applies.

CMP-264. Machine Learning. 3 Credits.
LECT 15 hrs LAB 60 hrs
This course provides a practical understanding and foundational principles of Machine Learning techniques. It offers the concepts, the intuitions, and the tools the students need to implement programs capable of learning from data. A large number of techniques are covered, from supervised learning algorithms, unsupervised learning algorithms to Deep Learning techniques and applications. The main goal of this course is to equip students with the skills to tackle real Machine Learning problems encountered in real life and business and establish a project portfolio
Prerequisites: MAT-114 AND CMP-131, OR Equivalent AND Department Permission
Additional Fees: Course fee applies.

CMP-280. Software Engineering. 3 Credits.
LECT 30 hrs LAB 30 hrs
Software engineering practices are examined in the context of the system development life cycle, comparing traditional structured approach and the object-oriented approach, with the main focus on object-oriented approach. Topics include user stories, use cases, object-oriented modeling, comprehensive project management, the Unified Modeling Language (UML) diagrams, Agile techniques, and user-interface design. Class projects provide students with practice in developing soft skills necessary to work as part of a team. Students participate in a semester-long team project to design an application using system analysis and design techniques.
Prerequisites: CMP-128 and one of the following: CMP-129, CMP-150, or CMP-241
Corequisites: CMP-241
Additional Fees: Course fee applies.

CMP-290. Independent Study in Information Technology. 3 Credits.
LECT 45 hrs
Students, in consultation with the department chair, undertake an in-depth analysis of a selected topic, problem or issue related to information technology or pursue additional computer-related work experience. Students are responsible for developing a statement of goals and strategies, maintaining a weekly log, and preparing a written and oral summary report. Computer Information Systems majors only.
Prerequisites: Permission of department chair
Additional Fees: Course fee applies.

CMP-291. Special Topics in Information Technology. 3 Credits.
LECT 45 hrs LAB 15 hrs
An examination of selected topics or issues in information technologies. Topics may differ each time the course is offered. Students should consult the department chair for additional information.
Prerequisites: Permission of department chair
Additional Fees: Course fee applies.

CMP-292. Special Topics in Information Technology. 3 Credits.
LECT 45 hrs LAB 15 hrs
An examination of selected topics or issues in information technologies. Topics may differ each time the course(s) is offered. Students should consult the department chair for additional information.
Prerequisites: Permission of department chair
Additional Fees: Course fee applies.

CMP-293. Special Topics in Information Technology II. 1 Credit.
LECT 15 hrs
An examination of selected topics or issues in information technologies. Topics may differ each time the course is offered. Students should consult the department chair for additional information. Computer Information Systems majors only.
Prerequisites: Permission of department chair
Additional Fees: Course fee applies.

CMP-296. Cooperative Work Experience-Information Technology (45-100 Hours). 1 Credit.
COOP 45 hrs
This course provides students in the Department of Information Technologies programs with job training and practical experience in a work environment prior to permanent employment amounting to between 45-100 hours in duration. The course may be taken in fulfillment of a Computer Information System (CIS) elective. Students desiring to participate in this experience should make their intention known to the department at the beginning of their second semester. Computing majors only.
Prerequisites: Permission of department chair.

CMP-297. Cooperative Work Experience-Information Technology (90-200 Hours). 2 Credits.
COOP 90 hrs
This course provides students in the Department of Information Technologies programs with job training and practical experience in a work environment prior to permanent employment amounting to between 90 to 200 hours in duration. The course may be taken in fulfillment of a Computer Information System(CIS) elective. Students desiring to participate in this experience should make their intention known to the department at the beginning of their second semester. Computing majors only.
Prerequisites: Permission of department chair.

CMP-298. Cooperative Work Experience-Information Technology (135-300 Hours). 3 Credits.
COOP 135 hrs
This course provides students in the Department of Information Technologies programs with job training and practical experience in a work environment prior to permanent employment amounting to between 135 to 300 hours in duration. The course may be taken in fulfillment of a Computer Information System(CIS) elective. Students desiring to participate in this experience should make their intention known to the department at the beginning of their second semester. Computing majors only.
Prerequisites: Permission of department chair.

ELT-100. Circuit Analysis DC/AC. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course introduces the student to both DC and AC circuit theory. It includes Ohm's and Kirchoff's laws for analysis of series and parallel circuits. Computer circuit simulation of series-parallel, ladder and bridge networks in both DC and AC are analyzed. Resonance and frequency response are included along with some discussion of AC power and transformers. The laboratory experiments are designed to support the theory and obtain measurement skills.
Prerequisites: MAT-110/equivalent and ENR 119 and ENR-124 OR MAT-110/equivalent and ENR-132 OR MAT-123
Additional Fees: Course fee applies.

ELT-102. Circuit Measurement and Fundamentals. 1 Credit.
LAB 30 hrs
An introductory course in electrical circuit analysis and measurement. This course will cover topics in DC and AC circuits, as well as the instruments needed to properly characterize the behavior of these types of circuits. This course is required by the majors in the Electronics Engineering Technology and the Biomedical Equipment Options, and will serve as a supplement to material covered in the Circuit Analysis course.
Corequisites: ELT-100
Additional Fees: Course fee applies.

ELT-110. Digital Principles. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course develops the fundamentals of the binary system. Circuit implementation from Boolean functions and map minimization. Course includes study of combinational logic, sequential logic circuits, flip-flops, counters and shift register. The laboratory allows the student to apply theory to practical digital circuits.
Additional Fees: Course fee applies.

ELT-115. Active Circuit Components. 3 Credits.
LECT 30 hrs LAB 60 hrs
This course introduces the behavior of semiconductor electronic devices and develops the device characteristics. Some DC and AC circuit theory is expanded upon so that the active devices can be properly analyzed. Biasing techniques and models of amplifier configurations are stressed for the bipolar transistor and field effect devices. Diodes, rectifiers, filtering and switching circuit applications are studied. Laboratory includes the verification of device characteristics and the testing of basic amplifier and switching configurations.
Prerequisites: ELT-201 OR ELT-100 AND ELT-102
Additional Fees: Course fee applies.

ELT-121. Circuit Analysis. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course introduces the student to both DC and AC circuit theory. It includes Ohm's and Kirchoff's laws for analysis of series and parallel circuits. Computer circuit simulation of series-parallel, ladder and bridge networks in both DC and AC are analyzed. Resonance and frequency response are included along with some discussion of AC power and transformers. The laboratory experiments are designed to support the theory and obtain measurement skills.
Prerequisites: MAT-110 and ENR-124
Additional Fees: Course fee applies.

ELT-123. Studio Maintenance. 3 Credits.
LECT 30 hrs LAB 30 hrs
For Music Recording majors only. This course provides students an introduction to music studio electronics. Basic skills of working with electronic components are covered, including soldering, the use of electronic measuring equipment and troubleshooting procedures. Studio cabling and infrastructure are dealt with extensively. Various wiring schemes and grounding techniques are examined to give the student an understanding of the typical music studio layout found in the professional environment. This course is for Music Recording majors only and does not serve as a technical elective for the Electronics Engineering Technology major. This course is offered in the Fall semester.
Prerequisites: MUS-165
Additional Fees: Course fee applies.

ELT-200. Biomedical Electronics. 3 Credits.
LECT 45 hrs
This course is the study of the techniques and theory behind the instrumentation utilized in hospital and health-related laboratory work. Emphasis is placed on physiological signals derived from the body and the problems and safety issues associated with their measurement. Demonstrations are conducted in class.
Prerequisites: ELT-115 and ELT-201.

ELT-201. Electricity and Electronics. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course is a fundamental study of electricity and electronics for Engineering Technology majors. The principles of electrical components and circuits are studied in class and laboratory. Topics include DC, AC series and parallel circuits, transformers and power supplies, solid state amplifiers and control components. The laboratory enables the student to apply the theory discussed in class and to gain some proficiency in the use of electronic measuring equipment.
Prerequisites: MAT-110 or equivalent and ENR-124
Additional Fees: Course fee applies.

ELT-209. Advanced Digital and Microprocessors. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course is an extension of digital theory into the operation and interfacing of microprocessors. Major topics include sequential logic design, memory organization, microprocessor architecture, machine level programming, A/D and D/A conversion, and serial and parallel interfacing. An associated laboratory provides for hands-on microprocessor interfacing and the use of logic analyzers.
Prerequisites: ELT-110 and ENR-120 or CMP-128
Additional Fees: Course fee applies.

ELT-210. Electronic Fabrication. 1 Credit.
LAB 45 hrs
This course provides students with an opportunity to learn about the process involved in the fabrication of electronic circuit boards. Using computer-aided drafting tools, students create an electronic component layout and necessary art work for the construction of a printed circuit board. Students are introduced to project management concepts and techniques, soldering, test specifications and printed circuit board construction. A term project or a series of smaller projects enables students to manage, build and assemble a printed circuit board and develop test specifications.
Prerequisites: ENR-117
Additional Fees: Course fee applies.

ELT-213. Active Circuit Design. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course covers analysis and design of solid-state amplifiers using bipolar and field effect transistors. Topics include frequency response using Bode plots and feedback analysis as applied to operational amplifiers and oscillators. Laboratory verification includes transistors, amplifiers, power amplifiers, IC operational amplifiers and oscillators.
Prerequisites: ELT-115
Additional Fees: Course fee applies.

ELT-215. Industrial Electronics. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course covers operational amplifiers in linear, non-linear and active filter applications, pulse and wave-shaping techniques, power supplies and regulators, thyristor control of power and transducers. The laboratory includes experiments in design and tests to support the above topics.
Prerequisites: ELT-209 and ELT-115
Additional Fees: Course fee applies.

ELT-227. Biomedical Clinical Experience. 3 Credits.
LECT 45 hrs
This course provides the student with a 200-hour internship at a local hospital. The student assists in the maintenance and calibration of biomedical electronic equipment. The student must abide by any rules and regulations stipulated in the affiliation agreement with the partnering hospital. As a minimum, the student is required to purchase liability insurance and agree to a criminal background check.
Prerequisites: ELT-200 and permission of department chair
Additional Fees: Course fee applies.

ELT-230. Optoelectronics. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course covers principles of light and linear optics characteristics of electro-optical light sources and detectors and their applications in industry, displays and communication (fiber optics). Lab experiments demonstrate electro-optical measurements and designs of typical applications of electro-optical devices.
Prerequisites: MAT-110
Additional Fees: Course fee applies.

ELT-231. Electronic Communication Systems. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course covers A.M., F.M., and single side-band communication systems, including an introduction to digital transmission. Designed to familiarize the student with transmitters, receivers, modems, noise analysis, information theory, pulse modulation, sampling, coding, multiplexing and other signal processing techniques used in commercial broadcasting and data transmission systems. The course includes some coverage of transmission lines, antennas, microwaves and satellites. Includes laboratory work involving communication system components and techniques using industrial grade equipment.
Prerequisites: ELT-201 OR ELT-100 AND ELT-102
Additional Fees: Course fee applies.

ELT-239. Cooperative Work Experience Electronics Engineering Technology. 3 Credits.
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This course provides a field experience in the laboratory facilities of an industrial firm. The course is designed for students in the Electronics Engineering Technology programs to obtain industrial experience as a supplement to their college studies prior to career employment. Seminar evaluation visitations are included. Students must have completed 35 credits to enroll.
Prerequisites: Permission of department chair.

ELT-250. Solar Photovoltaic and Alternative Energy Systems. 3 Credits.
LECT 30 hrs LAB 30 hrs
Examines the scientific principles, engineering design and implementation of solar photovoltaic (PV) systems. Students will learn about site assessment, specifying and evaluating hardware components, and modeling the economic performance for a solar PV system. In addition to solar, other alternative energy solutions will be studied as well. The course has been designed to meet the standards established by the North American Board of Certified Energy Practitioners (NABCEP) for their associate level certification. This course can be applied as an elective in the engineering technology degree programs or in the certificate programs.
Prerequisites: ELT-100
Additional Fees: Course fee applies.

ELT-291. Special Topics in Electronics Engineering Technology. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course provides an examination of selected topics or issues in Electronics Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.
Prerequisites: Permission of department chair.

ELT-292. Special Topics in Electronic Engineering Technology. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course provides an examination of selected topics or issues in Electronics Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.
Prerequisites: Permission of department chair.

ENR-103. Basic Engineering Graphics I. 1 Credit.
LAB 45 hrs
Students learn fundamentals of engineering drawing through freehand sketching. Course includes developing orthographic views including auxiliary views, dimensioning, sectioning, tolerancing, threads, fasteners, springs and assembly drawings. Course includes creation of pictorial drawings.

ENR-117. Computer-Aided Drafting I. 2 Credits.
LECT 15 hrs LAB 60 hrs
This course is an introduction to the concepts and operation of engineering drawing preparation using CAD (computer-aided drafting). The emphasis is on how CAD can reduce drawing time and improve accuracy. Students learn to use the AutoCAD software program to prepare drawings.
Additional Fees: Course fee applies.

ENR-118. Computer-Aided Drafting II. 2 Credits.
LECT 15 hrs LAB 60 hrs
This course is a continuation and enhancement of Computer-Aided Drafting I. Topics include prototype drawings, blocks, attributes, x-reference, grips, paper space and development of 3-dimensional solid modeling.
Prerequisites: ENR-117 or ENR-121
Additional Fees: Course fee applies.

ENR-119. Technical Computer Applications. 1 Credit.
LAB 45 hrs
This course provides an introduction to the various technical tools available to help solve problems in the field of engineering technology. This is a hands-on laboratory course designed to provide students with experience in using scientific calculators, Windows Operating System, Microsoft Office and Internet search tools. Special emphasis is placed on the development of technical reports using Microsoft Office's EXCEL and Word programs.
Prerequisites: MAT-007 or equivalent
Additional Fees: Course fee applies.

ENR-120. Technical Computer Programming. 2 Credits.
LECT 30 hrs LAB 30 hrs
This course is an introduction to computer programming with application to engineering technology. Microcomputers are used to develop application programs in a programming language.
Prerequisites: MAT-007 or equivalent
Additional Fees: Course fee applies.

ENR-121. Engineering Graphics. 2 Credits.
LECT 15 hrs LAB 45 hrs
This course is an introduction to computer aided design software and hardware. Covered are geometric constructions, multiview orthographic projection, dimensioning, sectioning, auxiliary view and axonometric projection and principles of descriptive geometry. A brief introduction to solid modeling is also included. This course is intended for Engineering Science students; Engineering Technology students take ENR-117.
Prerequisites: MAT-123
Additional Fees: Course fee applies.

ENR-123. Introduction to Engineering. 0 Credits.
LECT 15 hrs
This course provides the entering engineering student with an overview of the engineering profession and the design process. Topics discussed include the engineering course of study, academic advisement and transfer processes, types of engineering disciplines, problem-solving techniques, typical software tools, reporting techniques, and study skills.

ENR-124. Instrumentation and Measurements. 2 Credits.
LECT 15 hrs LAB 45 hrs
This course is an introductory study in the concepts involving physical measurements utilizing hands-on electrical and mechanical measurement applications. Use of basic instruments and transducers, accuracy and precision, units and standards of measurements, accounting and presentation of errors in measurements.
Prerequisites: MAT-007 or equivalent
Corequisites: ENR-119
Additional Fees: Course fee applies.

ENR-125. Computer Programming for Engineers. 3 Credits.
LECT 30 hrs LAB 30 hrs
A course in structured and object-oriented programming, emphasizing engineering applications and numerical methods in assignments. Program assignments are coded and are implemented on personal computers.
Prerequisites: MAT-123
Additional Fees: Course fee applies.

ENR-126. Computer Aided Design and Applications. 2 Credits.
LECT 15 hrs LAB 60 hrs
An introductory course in computer aided design using parametric solid modeling software. Creation of solid models of parts, generation of orthographic views, sectional views and auxiliary views are covered. Dimensioning and tolerancing of parts is emphasized along with development of appropriate files to make the parts for product development using rapid prototyping (3-D printing) and to manufacture parts using computerized numerical control machines.
Prerequisites: ENR-117
Additional Fees: Course fee applies.

ENR-130. Introduction to Engineering. 1 Credit.
LECT 15 hrs
This course provides the entering engineering student with an overview of the engineering profession and the design process. In addition this course is designed to assist the first year engineering science student in their adjustment and success with the college experience. Topics discussed include the engineering course of study, academic advisement and transfer process, types of engineering disciplines, solving techniques, academic expectations, time management and study skills.

ENR-132. Introduction to Experimentation and Design. 3 Credits.
LECT 30 hrs LAB 30 hrs
A required course in the Engineering Technology programs that introduces students to the field of engineering. Students will be introduced to experimental techniques, data collection and representation, as well as the proper method for documenting experimental results. The course will also cover topics that will help students succeed in their field of study and in their college experience.
Corequisites: MAT-016 or placement into MAT 110, or beyond
Additional Fees: Course fee applies.

ENR-134. Robotics and Automation I. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course provides an overview of control concepts, automation systems, and the application of robotic systems in modern industrial applications. Students explore coordinate systems, PLCs, types of automation, safety, equipment components, and various programming methods. Students are exposed to robotics-related applications and career options in the manufacturing, service, and medical industries.
Prerequisites: MAT-016 or placement into MAT 110, or beyond
Additional Fees: Course fee applies.

ENR-135. Robotics and Automation II. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course is a continuation of Robotics and Automation I and provides a more in-depth exploration of automation systems, PLC programming using I/O devices, system design, and integration. An in-depth study of applications programming will be covered during the semester. Programming will include different methods of error handling and operator interfacing used in robotic applications.
Prerequisites: ENR-134 and (CMP-128 or CMP-131).

ENR-220. Hydraulics and Fluid Power. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course is an exploration into the relationship between pressure, density and temperature as they relate to hydraulic and pneumatic systems. Topics include hydraulic pumps, motors and air compressors. The course emphasizes use of engineering standards and specifications for circuit design and component selection. Electrical controls and application to systems are covered. Lab sessions further expand upon lectures by providing students with physical evidence to support theories and ideas acquired in class.
Prerequisites: MAT-110
Additional Fees: Course fee applies.

ENR-222. Mechanics of Solids. 3 Credits.
LECT 45 hrs
Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending and combined stresses and column buckling. Also covered are axial force, shear moment and torque in structural members and in statically indeterminate systems. Elementary failure theory of structures and mechanical components is discussed.
Prerequisites: ENR-223.

ENR-223. Engineering Mechanics I (Statics). 3 Credits.
LECT 45 hrs
This course is a vector approach to statics in a plane and in three dimensions, equilibrium of particles and rigid bodies. Equivalent force systems, structural analysis, centroids and moments of inertia. Virtual work and applied engineering problems are incorporated.
Prerequisites: MAT-131 and PHY-130.

ENR-224. Engineering Mechanics II (Dynamics). 3 Credits.
LECT 45 hrs
This course is a calculus-based course in dynamics. Kinematics and kinetics of particles and rigid bodies, Newton's laws, work, energy, impulse and momentum are covered. Practical engineering problems are incorporated.
Prerequisites: ENR-223.

ENR-230. Engineering Strength of Materials. 4 Credits.
LECT 45 hrs LAB 45 hrs
Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending, and combined stresses and column buckling. Elementary failure theory of structures and mechanical components is discussed. Laboratory covers a variety of tensile stress-strain, impact and hardness tests, as well as shear stress-strain and the techniques of report writing.
Prerequisites: ENR-223
Additional Fees: Course fee applies.

ENR-232. Materials Science. 3 Credits.
LECT 45 hrs
This course covers the properties and structure of materials: atomic bonding, molecular, crystalline, noncrystalline structures and crystalline imperfections. It also covers metallic phases, equilibrium and nonequilibrium reactions, processing and properties of ferrous and non-ferrous metals, polymers, ceramics and composites. In addition, corrosion phenomenon is discussed.
Prerequisites: CHM-125 and CHM-126 and PHY-130.

ENR-234. Independent Study in Technology. 3 Credits.
LECT 45 hrs
This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress.
Prerequisites: Permission of department chair.

ENR-235. Engineering Circuit Analysis I. 3 Credits.
LECT 45 hrs
This first course in engineering circuit analysis covers DC circuit analysis including source transformations, mesh, nodal, superposition, Thevenin and Norton theorems, and the maximum power transfer theorem. Dependent as well as independent sources are included. Transient response of RC, RL and RLC circuits is introduced. Steady-state analysis of single and three phase AC systems is studied using phasor diagrams and the network theorems mentioned above. Real, reactive, apparent power and power factors are included. Use of the computer as a problem-solving tool is included in the course.
Prerequisites: MAT-132.

ENR-236. Engineering Circuit Analysis Laboratory I. 1 Credit.
LAB 45 hrs
This laboratory course includes experiments in DC, AC and transients to accompany the course work in Engineering Circuit Analysis I.
Corequisites: ENR-235
Additional Fees: Course fee applies.

ENR-237. Engineering Circuit Analysis II. 3 Credits.
LECT 45 hrs
This is a second course in engineering circuit analysis. Natural and step response of RL, RC and RLC circuits, mutual inductance, ideal transformers, series and parallel resonance are studied. Laplace transform theory is covered and includes step and impulse response in the S-domain. Bode diagrams of simple and quadratic factors are plotted and the computer is used for actual frequency and phase plots. Fourier Series are studied using both trigonometric and exponential forms.
Prerequisites: ENR-235
Corequisites: MAT-232.

ENR-238. Engineering Circuit Analysis Laboratory II. 1 Credit.
LAB 45 hrs
This laboratory course includes experiments on transformers, series and parallel resonance, filters and frequency/phase response plots, and two-port hybrid models to accompany the course work in Engineering Circuit Analysis II.
Prerequisites: ENR-236
Corequisites: ENR-237
Additional Fees: Course fee applies.

ENR-240. Engineering Technology Project. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course covers the design of products and processes considering functional requirements, manufacturing feasibility and economy, and the use of technical literature and catalogs. Includes design layout and working drawings and group and individual projects.
Prerequisites: ENR-117 and MEC-110 and MEC-141
Additional Fees: Course fee applies.

ENR-241. Instrumentation and Control. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course is an introduction to the study of measuring systems and components, digital and analog signals and their characteristics. Mechanical and electromechanical transducer elements are used to measure pressure, temperature, displacement, velocity and acceleration. Static and dynamic performance of instruments, statistical analysis of experimental data are explored. A brief study of process controllers, programmable logic controllers and final control elements are also explored.
Prerequisites: ELT-201
Additional Fees: Course fee applies.

ENR-264. Machine Learning. 3 Credits.
LECT 15 hrs LAB 60 hrs
This course provides a practical understanding and foundational principles of Machine Learning techniques. It offers the concepts, the intuitions, and the tools the students need to implement programs capable of learning from data. A large number of techniques are covered, from supervised learning algorithms, unsupervised learning algorithms to Deep Learning techniques and applications. The main goal of this course is to equip students with the skills to tackle real Machine Learning problems encountered in real life and business and establish a project portfolio.
Prerequisites: MAT-114 AND CMP-131, OR Equivalent AND Department Permission
Additional Fees: Course fee applies.

ENR-290. Special Topics in Technology. 1 Credit.
LECT 15 hrs
This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress when used for independent study. The course is also used to cover either current or future topics of interest in technology. Topics discussed will have relevance to either electronics technology, mechanical technology or both, and may vary each semester.
Prerequisites: Permission of department chair.

ENR-291. Special Topics in Engineering. 3 Credits.
LECT 45 hrs
This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.

ENR-292. Special Topics in Engineering. 3 Credits.
LECT 45 hrs
This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.

FST-101. Introduction to Fire Science. 3 Credits.
LECT 45 hrs
This class is considered to be the foundation course for all students of Fire Science Technology. Students are introduced to the concept of the systems approach to fire protection by presenting the components of modern fire department responsibility including emergency incident management, public education, training, resource management and customer service. Students who have completed their Fire Fighter 1 will receive credit for this course.

FST-102. Fire Prevention and Related Codes. 3 Credits.
LECT 45 hrs
This course provides students with basic knowledge of federal, state and local codes related to building construction, fire and life safety requirements, and other codes. Includes New Jersey state fire safety regulations and related state requirements. National Fire Protection Association (NFPA) and other standards related to fire protection and life safety are examined. Students who have completed their Fire Fighter 1 will receive credit for this course.

FST-103. Fire Fighting Tactics and Strategy. 3 Credits.
LECT 45 hrs
Analysis of the basic rules of fire fighting strategy, defining engine company responsibilities, defining ladder company functions, correlating mutual aid fires and general fire problems. Studies the effective management of suppression forces at various fire situations. Includes consideration of pre-fire planning, problem identification and solution implementation.

FST-106. Fire Protection Systems. 3 Credits.
LECT 45 hrs
A study of the nature of public and private fire protection with an emphasis on analysis of systems of fire detection, fire alarm, fire communications, water distribution networks, fire service, hydraulics and fire suppression.
Prerequisites: Permission of department chair.

FST-107. Fire Apparatus Specifications, Inspections and Maintenance. 3 Credits.
LECT 45 hrs
This course covers the principles of care, maintenance and operation of fire apparatus and pumps. Includes pump construction and accessories, pumping techniques, power development and transmission. Also includes driving, troubleshooting and producing effective fire streams.

FST-201. Fire Service Management. 3 Credits.
LECT 45 hrs
This course introduces the student to the principles of personnel management through the use of effective leadership techniques. Topics include overview of the fire service as an organization and the officer's role in it, interpersonal communications, personality typing, skill development, leadership techniques, group dynamics and principles of fire company management.
Prerequisites: FST-101 or equivalent.

FST-202. Hazardous Materials. 3 Credits.
LECT 45 hrs
A comprehensive study of the physical, chemical and toxicological characteristics of hazardous materials. This course includes basic methods of recognition and identification based upon the chemical and physical properties of hazardous materials, basic safety procedures when utilizing specific types of protective clothing and equipment, and basic tactical information relating to scene management.
Prerequisites: MAT-007 or passing score on the algebra section of the placement test.

FST-204. Fire Protection, Building Construction. 3 Credits.
LECT 45 hrs
This course introduces basic construction principles and the special characteristics of wood and ordinary construction as they concern the fire service. Primary emphasis is on improving the fire officer's ability to ensure firefighter safety by recognizing common causes and indicators of failure and other hazards relating to building construction. Course material enables the fire officer to better predict the overall reaction of a building to fire conditions.

FST-205. Fire Investigation. 3 Credits.
LECT 45 hrs
An in-depth course that defines successful methods for conducting fire investigations. Specific topics include basic chemistry of fire, point of origin, fire cause (both accidental and incendiary), motivation of the fire setter, fire scene investigations, evidence collection, photography, follow-up investigation and court testimony.

FST-206. Fire Hydraulics. 3 Credits.
LECT 45 hrs
This course is a concentrated study in the application of mathematics and physics to the properties of water as used in fire suppression operations. Classic hydraulics formulas are used to solve problems for flow velocity, nozzle reaction, friction loss, water distribution systems, fire flow testing, fire service pumps and fire ground hose evolutions.
Prerequisites: MAT-007 or passing score on the algebra section of the placement test.

FST-207. Emergency Medical Technician. 6 Credits.
LECT 60 hrs LAB 60 hrs
This course is designed to prepare the basic Emergency Medical Technician in accordance with the United States Department of Transportation curriculum and the New Jersey Department of Health guidelines. This course covers an introductory survey of emergency medical services including medical, legal/ethical aspects, role of the Emergency Medical Technician, patient assessment, care of wounds and fractures, airway maintenance, medical and environmental emergencies, patient transportation, emergency childbirth and basic extrication. After completion of this course, the student will be eligible to take the National Registry Examination for certification as an Emergency Medical Technician-Basic. Students who are already registered EMT-Basic in New Jersey will be given credit for this course.

FST-210. Current Issues in Fire Science/ Capstone Experience. 3 Credits.
LECT 45 hrs
A review of the current problems affecting the fire service with particular emphasis on resource allocation, planning and fiscal constraints. The capstone experience requires the student to author and present a scholarly research paper on a topic covered in this course. Students must have completed 40 credit hours in the Fire Science Curriculum or have permission of department chair.
Prerequisites: Permission of department chair.

MEC-104. Statics. 3 Credits.
LECT 45 hrs
This course provides an analysis of force systems acting on particles and rigid bodies; equilibrium in two and three dimensions; trusses, frames and machines; and friction, centroids and moment of inertia of areas.
Prerequisites: MAT-110, ENR-119 and ENR-124 or MAT-110 and ENR-132 or MAT-123.

MEC-109. Manufacturing Process for Engineering Technology. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course is a study of the methods of prototyping including an introduction to precision measurements, elementary theory of cutting and machining methods with emphasis on the proper operation of the manual lathe and the vertical mill. The course will also provide the student with an introduction to the Computer-Aided Manufacturing (CAM) and the related field of Computerized Numerical Control (CNC). Topics include machine setup, CNC code, both manual and computer assisted, tool offsets and tool changing.
Additional Fees: Course fee applies.

MEC-110. Materials for Engineering Technology. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course covers metallic, plastic and ceramic materials that are important to manufacturing. Topics include: molecular and microscopic structures in relationship to material properties, testing of mechanical and thermal properties with reference to ASTM standards, equilibrium diagrams and physical metallurgy emphasizing steel and aluminum, heat treatment of steel, molding and forming methods for plastics. A brief study of ceramics and composites is included.
Prerequisites: MAT-007 or equivalent
Additional Fees: Course fee applies.

MEC-117. Mechanical Prototyping. 2 Credits.
LECT 22.5 hrs LAB 22.5 hrs
This course is a study of the methods of prototyping including an introduction to precision measurements, elementary theory of cutting and machining methods with emphasis on the lathe operation, milling, drilling and grinding. This course runs for eight weeks.
Additional Fees: Course fee applies.

MEC-118. Computer Integrated Manufacturing (CIM). 2 Credits.
LECT 22.5 hrs LAB 22.5 hrs
This course is a study of the methods of Computer-Aided Manufacturing (CAM) and the related field of Computerized Numerical Control (CNC). Topics include machine setup, CNC code, manual and post processed programs, rapid prototyping, tool offsets, and tool changing. This course runs for eight weeks.
Prerequisites: MEC-117 or industrial experience
Additional Fees: Course fee applies.

MEC-141. Strength of Materials for Engineering Technology. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course studies the mathematical determination of stress and deflection for materials having applied loads of normal, shear, torsion, bending or combinations of these. The rational design of mechanical components, such as fasteners, weldments, tanks, shafts, beams and columns, to satisfy stress, deflection and stability criteria are studied. Also included are Mohr's circle and strain gauge techniques. This course is intended for Engineering Technology students; Engineering Science students should take ENR-230, Engineering Strength of Materials.
Prerequisites: MEC-104 and MAT-110
Additional Fees: Course fee applies.

MEC-155. Mechanical Components. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course develops the fundamentals of sketching, blueprint reading, dimensioning, tolerances, preferred sizes and fits, and evaluating product quality. It also introduces students to the theory of function of mechanical elements such as linkages, cam bearings, gears belt and chain drives, springs, brakes, clutches, welds, keys, fasteners and power screws.
Prerequisites: MAT-007 or equivalent.

MEC-204. Dynamics for Technology. 2 Credits.
LECT 30 hrs
This course provides an understanding of the mathematics of the motion of particles and rigid bodies, and of the relation of forces and motion of particles. Upon successful completion of this course, students will describe the motion of particles and rigid bodies as functions of time and position, develop their equations of motions due to applied forces, and determine post impact behavior.
Prerequisites: MAT-110, MEC-104
Corequisites: PHY-111.

MEC-209. Introduction to Advanced Manufacturing And CNC Programming. 3 Credits.
LECT 30 hrs LAB 30 hrs
A continuation in the manufacturing process using Computer Numerical Controlled (CNC) milling and turning. Students will learn about and develop advanced manual CNC programs as well as computer-assisted programs (post-processed) derived from CAD (Computer Aided Drafting) drawings. The CNC programs will focus mainly on operations involving three axis milling machines and two axis lathes, but will also touch on operations involving advanced fixture setup and control. Topics will include spindle controls, tool changes, linear and circular interpolation, drilling and tapping, subroutines, and G&M codes. In addition, the course will cover a variety of advanced manufacturing techniques in additive manufacturing (3D Printing), EDM (Electrical Discharge Machining), and reverse engineering techniques using scanners and the CMM (Coordinate Measuring Machine).
Prerequisites: ENR-117 and ((MEC-117 and MEC-118) or MEC-109)
Additional Fees: Course fee applies.

MEC-229. Cooperative Work Experience-Mechanical Engineering Technology. 3 Credits.
COOP 45 hrs
Registration is only upon written recommendation of advisor. This course is a field experience in the laboratory facilities of an industrial firm. It is designed for students in the Mechanical Engineering Technology program to obtain industrial experience as a supplement to college studies prior to career employment. Seminar evaluation visitations are included. Completion of 25 technical credits required to enroll.
Prerequisites: Permission of department chair.

MEC-235. Kinematics. 3 Credits.
LECT 30 hrs LAB 45 hrs
This course is a study of moving elements as used in the design and analysis of basic mechanisms in machines. Velocity and acceleration analysis on a plane, design and analysis of 4-bar linkages, cams, gears and other mechanisms using graphical and analytical methods are studied.
Prerequisites: MAT-110
Corequisites: PHY-111
Additional Fees: Course fee applies.

MEC-236. Machine Design. 4 Credits.
LECT 45 hrs LAB 45 hrs
This course is the rational design and selection of machine elements considering their economics and manufacturability. The principles of strength of materials and mechanics are applied to the design of bearings, shafts, gears, springs, brakes and other elements of importance in mechanical systems. Consideration of service criteria, operating environment and cost. Emphasis is placed on developing a systematic design philosophy.
Prerequisites: MEC-141
Additional Fees: Course fee applies.

MEC-291. Special Topics in Mechanical Engineering Technology. 3 Credits.
LECT 45 hrs
This course is an examination of selected topics or issues in Mechanical Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.
Prerequisites: An introductory course in Mechanical Engineering Technology.

MEC-292. Special Topics in Mechanical Engineering Technology. 3 Credits.
LECT 45 hrs
This course is an examination of selected topics or issues in Mechanical Engineering Technology. Topics may differ each time the course is offered. Students should consult the department chair for further information.
Prerequisites: An introductory course in Mechanical Engineering Technology.

MED-110. Multimedia I. 3 Credits.
LECT 45 hrs
Multimedia I is a survey course designed to allow students to explore, discuss, develop and use multimedia technology.This computer-based course offers an extensive overview of the technologies of multimedia. Students engage in issues related to usability, management and distribution.Topics include multimedia development and design, media elements, and emerging hardware and software trends. Several projects throughout the course give students hands-on experience with a variety of digital multimedia tools.
Additional Fees: Course fee applies.

MED-113. Multimedia II. 3 Credits.
LECT 45 hrs
An advanced course designed to allow students to apply the theory and basic practical knowledge presented in Multimedia I. Students apply their knowledge productions for DVD, local networks or the Internet. Students incorporate traditional media production elements such as video and audio combined with the latest features and technologies. Conceptualization, user interface design and prototyping are key course elements. A multimedia prototype project that demonstrates conceptual and technical understanding is required.
Prerequisites: MED-110
Additional Fees: Course fee applies.

MED-119. Digital Media Production. 3 Credits.
LECT 45 hrs
This course provides students with theory and training in the area of digital content development for digital media productions. Software and hardware training in digital video, audio, animation, and graphics are introduced. In addition, the appropriate use of these areas of content in developing digital media productions and interface design are discussed.
Additional Fees: Course fee applies.

MED-210. Digital Video Editing. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course provides students with the fundamental principles of video editing with a focus on the techniques and technology used to achieve a superior final product. An in-depth exploration of non-linear editing concepts includes a deeper understanding of primary, secondary and tertiary motion, shot types, sequencing, transitions and continuity. Students learn to log and capture raw video, assemble shots on a timeline, create, add, and edit text, audio tracks, title animation, effects, transitions, continuity and video compositing. This course is ideal for students who wish to create and edit a professional video for broadcast, webcast and other motion media venues.
Prerequisites: MED-113 or COM-211
Additional Fees: Course fee applies.

MED-213. Multimedia Authoring and Design. 3 Credits.
LECT 45 hrs
Using industry-standard authoring software, students apply multimedia technology to assemble a real-world interactive multimedia project. Concepts and principles of user interface design, digital audio and video production, team production techniques and usability testing are employed. As members of a production team, students plan, manage and implement a complex multimedia production project.
Prerequisites: MED-113
Additional Fees: Course fee applies.

MED-220. Animation. 3 Credits.
LECT 45 hrs
This is an introductory course in 3D modeling and animation software to create animated imagery for video and multimedia applications. Software includes 3D Studio Max (3D animation) and Adobe Premiere and AfterEffects (digital video). Through assigned projects, students learn to combine live video and animation with compositing and bluescreening techniques.
Additional Fees: Course fee applies.

MED-240. Advanced Animation. 3 Credits.
LECT 45 hrs
This advanced-level course is a continuation of MED-220 Animation and is designed to expose students to high-end 3-D modeling tools for digital animation, electronic post-production, digital special effects and digital multimedia. This course explores advanced applications in digital compositing, particle systems, Newtonian algorithms, kinemation, dynamation and 3-D characters.
Prerequisites: MED-220
Additional Fees: Course fee applies.

MED-292. Special Topics in Media. 3 Credits.
LECT 45 hrs
An examination of selected topics or issues in media. Topics may differ each time the course(s) is/are offered. Students should consult the department chair for further information. Available only to Digital Media Technology majors.
Prerequisites: Permission of department chair
Additional Fees: Course fee applies.

TEL-107. Computers and Data Networks. 3 Credits.
LECT 30 hrs LAB 30 hrs
This course introduces basic networking principles focusing on network terminology and protocols. Ethernet, Internet Protocol addressing/subnetting and network topologies will be explored. The laboratory component will cover topics on computer setup, network setup and integration and operating system utilities. Local area networks (LANs), wide area networks (WANs) and wireless local area networks (WLANs) will be used in the labs.
Prerequisites: CMP-130
Additional Fees: Course fee applies.

TEL-110. Routing I. 3 Credits.
LECT 30 hrs LAB 30 hrs
The course introduces basic routing principles in a network environment, supplemented with industry-standard labs, such as those provided by CISCO. Lecture and laboratory assignments are an integral part of the course. The course focuses on network terminology and protocols, local area networks (LANs), wide area networks (WANs), Open System Interconnection (OSI) networking model, cabling, cabling tools, routers, router programming, Ethernet, Internet Protocol addressing/subnetting and network standards.
Prerequisites: TEL-107
Additional Fees: Course fee applies.

TEL-120. Routing II (CISCO). 3 Credits.
LECT 30 hrs LAB 45 hrs
The course follows CISCO's CCNA2 curriculum for Routers and Routing Basics. The course focuses on initial router configuration, CISCO IOS software management, routing protocol configuration, TCP/IP and access control lists (ACLs). Through lectures and laboratory assignments, students develop the skills to configure and maintain a router as well as the creation of software firewalls.
Prerequisites: TEL-110
Additional Fees: Course fee applies.

TEL-220. Routing III (CISCO CCNA3 & CCNA4). 4 Credits.
LECT 45 hrs LAB 45 hrs
This course follows CISCO's CCNA3 curriculum for Switching and Intermediate Routing and CISCO's CCNA4 curriculum for WAN Technologies. The first half of the course focuses on advanced IP addressing techniques (Variable Length Subnet Masking (VLSM), intermediate routing protocols (RIP v2, single-area OSPF, EIGRP), command-line interface configuration of switches, Ethernet switches, Virtual LANs (VLANs), Spanning Tree Protocol (STP) and VLAN Trunking Protocol (VTP). The second half of the course focuses on advances IP addressing techniques (Network Address Translation (NAT), Port Address Translation (PAT), and (DHCP), WAN terminology and technology, PPP, ISDN, DDR, Frame Relay, network management and an introduction to optical networking. Preparation is also given to the study of CISCO's CCNA certification examination. Students learn through lecture and laboratory assignments.
Prerequisites: TEL-120
Additional Fees: Course fee applies.

TEL-233. Network Operating Systems. 3 Credits.
LECT 45 hrs LAB 15 hrs
This course introduces various network fundamentals and multiuser network operating systems, and it focuses on the functions of a network operating system so the student can effectively maintain and manage a network. Topics of study include how to establish and oversee the operations of a network, create logins, design and establish directory structures, implement security and troubleshoot the network.
Prerequisites: CMP-255
Additional Fees: Course fee applies.

TEL-290. Independent Study in Telecommunications Systems Technology. 3 Credits.
LECT 45 hrs
Students, in consultation with a Telecommunications Technology advisor, undertake an in-depth analysis of a selected topic, problem or issue related to the telecommunications industry or pursue additional related work experience. Students are responsible for developing a statement of goals and strategies, maintaining a weekly log and preparing a written and oral summary report. Written permission must be obtained from the department before registering for this course.
Prerequisites: Permission of department chair.