COLLEGE OF AERONAUTICS AND ENGINEERING

College of Aeronautics and Engineering
Aeronautics and Technology Building
Kent Campus
330-672-2892
cae@kent.edu
www.kent.edu/cae

Academic Advising Office
127 Aeronautics and Technology Building
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Mission
The mission of the College of Aeronautics and Engineering is to enhance technological literacy, education and training essential to the knowledge economy, socio-economic well-being and to the workforce development of the state of Ohio in general and Northeast Ohio in particular. The college's curricula leads to various certificates in emerging/high-technology areas and to a seamless articulation with technical associate, bachelor's and master's degree programs with global perspectives for careers in business, industry, education and government sectors.

Undergraduate Programs
• Aeronautical Systems Engineering Technology - B.S.
• Aeronautics - B.S.
• Aerospace Engineering - B.S.
• Applied Engineering - B.S.
• Computer Engineering Technology - B.S.
• Mechanical Engineering Technology - B.S.
• Mechatronics Engineering - B.S.
• Mechatronics Engineering Technology - B.S.

Minors
• Aircraft Dispatch
• Aviation Management
• Aviation Weather
• Computer Engineering Technology
• Electronic Technology
• Flight Technology
• Innovation
• Safety, Quality and Lean in Manufacturing
• Sustainability
• Technology
• Unmanned Aircraft Systems

Graduate Programs
• Aviation Management and Logistics - M.S.
• Technology - M.Tech.

College of Aeronautics and Engineering Faculty
• Abdul-Aziz, Ali (2016), Associate Professor
• Amiruzzaman, Md (2009), Assistant Professor, Ph.D., Kent State University, 2016
• Armann, George (2015), Lecturer, B.S., Ohio University, 2006
• Bloebaum, Christina L. (2018), Professor & Dean
• Boergerhoff, Jason T. (2010), Associate Professor, M.S., University of North Dakota, 2010
• Boyd, Darwin L. (1983), Assistant Professor, Ph.D., Kent State University, 1991
• Chen, Xuhui (2019), Assistant Professor, Ph.D., Case Western Reserve University, 2019
• Chowdhury, Aminur R. (1997), Professor, Ed.D., West Virginia University, 1979
• Dorsey, C M. (2011), Lecturer, B.S., Kent State University, 1973
• Du, Yanhai (2013), Associate Professor, Ph.D., University of Waikato, 2004
• Fisch, Michael R. (1998), Associate Professor
• Hassler, Richard P. (2018), Assistant Professor
• Koptur, Evren (2003), Assistant Professor, Ph.D., Kent State University, 2016
• Kunda, Sarah C. (2014), Lecturer, M.D.S., Kent State University, 2015
• LaBerge, Kelsen E. (2018), Associate Professor
• Lorenzon, Jason (2007), Lecturer, J.D., Cleveland State University, 2007
• Lu, Ye (2019), Assistant Professor, 2019, Ph.D., 2019
• Mangrum, Richard L. (2003), Professor, Ed.D., Oklahoma State University, 2003
• McFarland, Maureen R. (2003), Assistant Professor & Associate Dean, Ph.D., Kent State University, 2017
• Merriman, Jenna (2017), Lecturer
• Mirinejad, Hossein (2019), Assistant Professor
• Nettex, Richmond I. (2001), Professor, Ph.D., University of Houston, 2000
• Oh, Chang-Geun (2016), Assistant Professor, Ph.D., Wright State University, 2015
• Palcho, Timothy L. (2000), Professor
• Ripple, James E. (2008), Assistant Professor, B.A., Kent State University, 1991
• Shen, Tao (2019), Assistant Professor
• Song, Shin-Min (2012), Professor, Ph.D., The Ohio State University, 1984
• Stringer, David B. (2013), Associate Professor, Ph.D., University of Virginia, Main Campus, 2008
• Testa, Michael (2017), Lecturer, M.S.M., University of Akron, 1997
• True, Trent (2004), Lecturer, M.Tech., Kent State University, 2007
• Uribe-Rendon, Roberto M. (1990), Professor, Ph.D., National Autonomous University of Mexico, 1986
Aeronautics (AERN)

AERN 15000  INTRODUCTION TO AERONAUTICS  3 Credit Hours
Introduction to aeronautical and aerospace technology, including historical development, underlying science and technical applications. The past, present and future social, economic, technical and political impact of aviation are also explored.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 15250  FAA ORIENTATION  3 Credit Hours
Introduction to the Federal Aviation Administration with particular emphasis on its role and impact on air traffic management and the National Airspace System (NAS). Course addresses the unique aspects and requirements of federal employment, as well as federal regulations affecting flight operations and the FAA’s associated supporting agencies.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 15300  INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB®  3 Credit Hours
Introduction to basic concepts in engineering analysis using the Matlab® computing language, the industry-standard “first language” for engineers. Introduction to problem solving, algorithm coding and development, debugging, analysis and interpretation.
Prerequisite: None.
Corequisite: MATH 12002.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

AERN 15500  INTRODUCTION TO AEROSPACE ENGINEERING  3 Credit Hours
Pre/corequisite: MATH 12002.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 15740  ELEMENTS OF FLIGHT THEORY  5 Credit Hours
Basic instruction in all areas which gives the student aeronautical knowledge required for a private pilot certificate.
Corequisite: AERN 15741.
Schedule Type: Lecture
Contact Hours: 5 lecture
Grade Mode: Standard Letter-IP

AERN 15741  PRIVATE PILOT FLIGHT  3 Credit Hours
Flight course designed to fulfill FAA requirements for private pilot certificate. With special approval, this course may be repeated only once. Student is required to spend a minimum of 2 hours each day, five days a week, at the airport, until course requirements have been attained. When not flying, the student goes through personalized ground instruction. Minimum FAA flight time requirements towards the private pilot certificate is 48 hours. Actual flight training may exceed 48 hours. Special course fees apply. Please visit www.kent.edu. Students must obtain Student Pilot Certificate and have and maintain valid medical and TSA approval prior to starting course.
Prerequisite: Must be a Flight Technology (FLGT) concentration within the Aeronautics (AERN) major.
Corequisite: AERN 15740 and MATH 11010.
Schedule Type: Flight Training
Contact Hours: 9 other
Grade Mode: Standard Letter-IP

AERN 15742  PRIVATE PILOT HELICOPTER FLIGHT  3 Credit Hours
Flight course designed to fulfill Federal Aviation Administration (FAA) requirements for the private pilot helicopter certificate. This course may only be repeatable twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the FAA minimum requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Minimum FAA flight time requirements towards the Private Pilot Helicopter Flight Certificate is 40 hours. Actual flight training may exceed 40 hours. Students must obtain Student Pilot Certificate prior to starting course. Students must also have and maintain valid medical and TSA approval prior to starting course.
Prerequisite: Minimum 2.500 cumulative GPA; and AERN 15740; and must be in the Flight Technology (FLGT) concentration in the Aeronautics (AERN) major.
Corequisite: AERN 35101.
Schedule Type: Flight Training
Contact Hours: 5.5 other
Grade Mode: Standard Letter-IP

AERN 15743  PRIVATE PILOT HELICOPTER FLIGHT ADD-ON  2 Credit Hours
Flight course designed to fulfill Federal Aviation Administration (FAA) requirements for the private pilot helicopter certificate. This course may only be repeatable twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the FAA minimum requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Minimum FAA flight time requirements towards the Private Pilot Helicopter Flight Certificate is 40 hours. Actual flight training may exceed 30 hours. With special approval, this course may be repeated only once. Students must obtain Student Pilot Certificate prior to starting course. Students must also have and maintain valid medical and TSA approval prior to starting course.
Prerequisite: AERN 15740 and 15741; and minimum 2.500 overall GPA; and must be in the Flight Technology (FLGT) concentration in the Aeronautics (AERN) major.
Corequisite: AERN 35101.
Schedule Type: Flight Training
Contact Hours: 4.86 other
Grade Mode: Standard Letter-IP
AERN 15745 NON-PILOT ELEMENTS OF FLIGHT THEORY  3 Credit Hours
Basic instruction in areas to include: Federal Regulations, navigation, communication, airspace, weather, basic aerodynamics, and aero-medical factors which give the student a foundation in aeronautics. This course does not satisfy the Federal Aviation Regulation requirement for endorsement to take the Airman Knowledge Exam for a private pilot nor does it satisfy the Aircraft Dispatch minor.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 20000 PROFESSIONAL DEVELOPMENT IN AERONAUTICS I  1 Credit Hour
The course will provide an overview of the current state of the aeronautics industry while preparing students for various internship and scholarship opportunities. Students will begin preparation for a career in the aeronautics industry by establishing a professional foundation in the areas of career planning and goal setting.
Prerequisite: Sophomore standing.
Schedule Type: Lecture
Contact Hours: 1 lecture
Grade Mode: Standard Letter
AERN 25100 INTRODUCTION TO AVIATION MANAGEMENT  3 Credit Hours
Introduction to the day-to-day concepts of Airline, Airport, and other businesses pertaining to the aviation industry.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25200 STATICS  3 Credit Hours
Forces and moments; equilibrium in two and three dimensions; multi-force members; equilibrium, centroids and friction.
Prerequisite: MATH 12003 and PHY 23101.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25250 ELEMENTS OF AVIATION WEATHER  3 Credit Hours
Aviation weather provides a comprehensive look at the Earth’s atmosphere, general patterns and specific phenomena, and a focus on weather as related to flight.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25251 WEATHER INFORMATION SYSTEMS  3 Credit Hours
Introduction to various weather sensing equipment and the systems that deliver weather information to various users. An in-depth look at the National Weather Service, NOAA, NASA, FAA and commercially available weather information systems.
Prerequisite: AERN 25250 or GEOG 31062.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25252 THUNDERSTORMS AND SEVERE WEATHER  3 Credit Hours
Analysis and forecast of thunderstorm and severe convective weather activity development and movement. Analysis of atmospheric information and clouds, radar, computer models, and charts. A study of mid-latitude cyclones and some focused study on tropical depressions, hurricanes, tornadoes, dust and sand storms. Study includes geographic effects and cyclone life cycles. Provides an in-depth look at the development of severe weather products for aviation such as AIRMET, SIGMET and Convective SIGMET.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25350 FUNDAMENTALS OF AIR TRAFFIC CONTROL  2 Credit Hours
Introduction to the National Airspace System (NAS) and the orders, manuals, and procedures associated with the purposes and directives of the air traffic control environment. Introduces and discusses those areas of required knowledge of the AT-Basics needed to become an Air Traffic Controller. These topics include the principles of flight, the FARs, navigation, aviation weather and other ATC related areas.
Prerequisite: Aeronautics major.
Corequisite: AERN 25351.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter
AERN 25351 FUNDAMENTALS OF AIR TRAFFIC CONTROL LABORATORY  1 Credit Hour
Introductory laboratory course on air traffic management and the National Airspace System, the orders, manuals and procedures associated with the purposes and directives of the air traffic control environment. To include purposes and responsibilities of the ATC system.
Prerequisite: Aeronautics major.
Corequisite: AERN 25350.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter
AERN 25400 DYNAMICS  3 Credit Hours
Kinematics and kinetics of rigid bodies in planar motion and an introduction to the kinematics and kinetics of rigid bodies in three-dimensional motion.
Prerequisite: AERN 25200; and MATH 22005 or MATH 32051.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25500 AERODYNAMICS FOR ENGINEERS  3 Credit Hours
Basic fluid dynamics concepts, conservation laws, potential, airfoil and wing analysis. Boundary layers on plates and airfoils. Pressure gradients. Introduction to turbulent and vortex-dominated flows.
Prerequisite: AERN 15500; and MATH 22005 or MATH 32051.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
AERN 25743 COMMERCIAL PILOT FLIGHT I 2 Credit Hours
Advanced flight course providing flight instruction for the commercial pilot. Primary emphasis is on cockpit resource management, advanced navigational practices and basic instrument instruction. With special approval, this course may be repeated only once. Student is required to spend a minimum of two hours daily, four days a week, at the airport until all course requirements have been attained. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu.cae for a list of fees.
Prerequisite: A minimum C grade in both AERN 15740 and AERN 15741; and minimum 2.500 overall GPA; and must be in the Flight Technology (FLGT) concentration in the Aeronautics (AERN) major.
Corequisite: AERN 25250 and MATH 11010.
Schedule Type: Flight Training
Contact Hours: 2 other
Grade Mode: Standard Letter-IP

AERN 25800 INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS 3 Credit Hours
An overview of unmanned aircraft systems. Course topics include the history, development, and evolution of unmanned aircraft; current and forecast trends and issues; capabilities and performance of unmanned aircraft; UAS applications; regulations governing unmanned aircraft systems; unmanned aircraft flight operations; and opportunities and career paths in unmanned aircraft systems.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 30000 PROFESSIONAL DEVELOPMENT IN AERONAUTICS II 1 Credit Hour
The course will build upon the lessons learned in Professional Development in Aeronautics I by providing direct opportunities for interviewing and networking with professionals working in the aeronautics industry. Students will continue preparation for a career in the aeronautics industry by revising and implementing their career plan and goals.
Prerequisite: AERN 20000; and junior standing.
Schedule Type: Seminar
Contact Hours: 1 lecture
Grade Mode: Standard Letter

AERN 35001 AIRCRAFT FABRICATION 3 Credit Hours
The study and laboratory practice of government approved procedures used in the fabrication, repair and testing of certificated aircraft.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35020 AIRCRAFT PROPULSION SYSTEMS 3 Credit Hours
A study of basic reciprocating and gas turbine engine theory. Course investigates powerplant construction, component function, including propeller and fuel systems, ancillary systems that support aircraft propulsive systems and performance characteristics.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35021 RADAR SATELLITE WEATHER INFORMATION 3 Credit Hours
A study of satellite and radar imagery. A focus on both passive and active remote sensing systems. Student develops an understanding of the properties of meteorological radar sensing, signal propagation and estimating precipitation. Provides an in-depth look at radar and satellite products and their application to aircrew operations. Emphasis is placed on real-time identification of weather phenomena affecting a flight in progress.
Prerequisite: AERN 25250 or GEOG 31062.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35022 WEATHER STRATEGY FOR AIRCREWS 3 Credit Hours
Flying strategies for various weather conditions to include low ceilings and visibility, turbulence, cold weather, thunderstorms, and wind shear. An exploration of basic and advanced weather theory and how to get the best use of FAA and commercially available forecast products and briefing services. Course takes a condition-by-condition look at various hazardous weather phenomena.
Prerequisite: AERN 25250 or GEOG 31062.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35030 INTRODUCTION TO CORPORATE AVIATION 3 Credit Hours
Introduces students to the business and corporate sectors of commercial aviation. Examines business and corporate aviation from the joint perspectives of operations and maintenance management as well as flight operations.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35031 AVIATION INDUSTRY REGULATIONS 3 Credit Hours
This course will examine the functions of the regulatory agencies in the aviation industry. The evolution of Administrative Regulation, Federal Aviation Regulation and the rulemaking process.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35040 AIRCRAFT SYSTEMS I 3 Credit Hours
In-depth study of various aircraft systems including electrical systems, environmental control systems, and fuel systems as applied to aircraft.
Prerequisite: PHY 13012.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35095 SPECIAL TOPICS IN AERONAUTICS 1-3 Credit Hours
(Repeatable for credit) Specialized offerings of interest in response to emerging or needed curricular needs in aeronautics. Topics will be announced in the schedule of classes.
Prerequisite: Aeronautics major; and sophomore standing.
Schedule Type: Lecture
Contact Hours: 1-3 lecture
Grade Mode: Standard Letter
AERN 35101 HELICOPTER FLIGHT THEORY 3 Credit Hours
Study of helicopter flight and operations that includes rotor system
dynamics, control functions, major components, operation and
performance.
Prerequisite: Aeronautics major.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35150 AIRCRAFT STRUCTURES 3 Credit Hours
Aircraft structural design investigations dealing with theory and
applications in aviation.
Prerequisite: PHY 13001.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

AERN 35200 THERMAL FLUID ENGINEERING 3 Credit Hours
First and Second Law of Thermodynamics for closed and open systems.
Fundamentals of fluid mechanics and heat transfer.
Prerequisite: MATH 22005 or MATH 32051; and PHY 23101.
Corequisite: AERN 35201.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35201 THERMAL-FLUID ENGINEERING LABORATORY 1 Credit Hour
Laboratory demonstrations and experiments for various heat transfer and
fluid dynamics concepts.
Prerequisite: None.
Corequisite: AERN 35200.
Schedule Type: Lecture
Contact Hours: 2 lab
Grade Mode: Standard Letter

AERN 35300 AEROSPACE VEHICLE PERFORMANCE 3 Credit Hours
Performance analysis of fixed-wing aircraft, rotorcraft, and spacecraft.
Equations of motion, evaluation of forces, and performance calculations.
Steady and accelerated flight performance.
Prerequisite: AERN 25500; and MATH 32044 or MATH 32052.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35339 FIXED BASE OPERATOR OPERATIONS 3 Credit Hours
A study of general aviation operations and the role of Fixed Base
Operators in the National Aviation System; management functions;
marketing; profit; cash flow; financing; human resources; organization;
administration; management information systems; operations;
maintenance; safety; liability; physical facilities; and the future of general
aviation.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35340 AIRPORT MANAGEMENT 3 Credit Hours
Introduction to the many functions that are involved in the operation and
management of an airport. Includes an analysis of the development of the
airport- airway system, airport legislation, airport planning and airport
operations.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35341 AIR TRANSPORTATION SYSTEMS 3 Credit Hours
Descriptive course in airline operations as seen from the air carrier’s
business perspective. Emphasis is on business practices and techniques
unique to aviation.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35400 SYSTEM DYNAMICS AND CONTROL 3 Credit Hours
Dynamic modeling and response of systems with mechanical, hydraulic,
electrical, and or thermal elements. Classical methods of feedback
control system design and analysis.
Prerequisite: MATH 32044 or MATH 32052; and minimum C grade in
AERN 25400.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
### AERN 35500  SIGNALS AND CIRCUITS  3 Credit Hours
An introduction to electric circuit elements and electronic devices and a study of circuits containing such devices. Both analog and digital systems are considered.
**Prerequisite:** AERN 35400 and PHY 23102.
**Corequisite:** AERN 35501.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

### AERN 35501  SIGNALS AND CIRCUITS LABORATORY  1 Credit Hour
Laboratory demonstrations and experiments for electrical circuits, data acquisition, and signal measurements.
**Corequisite:** AERN 35500.
**Schedule Type:** Laboratory
**Contact Hours:** 2 lab
**Grade Mode:** Standard Letter

### AERN 35600  HIGH-SPEED AERODYNAMICS  3 Credit Hours
Compressibility effects on airfoil and wing aerodynamics; supersonic potential flow; method of characteristics; boundary layer effects on aircraft performance.
**Prerequisite:** AERN 25500, AERN 35200; and MATH 32044 or MATH 32052.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

### AERN 35644  INSTRUMENT FLIGHT THEORY  3 Credit Hours
Course instruction on Instrument Flight to include, navigation facilities (both ground and aircraft), weather theory and weather specific to instrument meteorological conditions, weather charts and sources, cross-country flight planning for IFR, FAA regulations specific to IFR flight, Charts for Instrument Flight, Aircraft Performance, Decision Making, Aircraft Systems and Instruments related to IFR Flight, and Instrument Flight techniques and procedures. This course meets the requirements for endorsement to take the FAA Airman Knowledge Exam for an Instrument Rating and satisfies the requirements of the Training Course Outline approved by the FAA.
**Prerequisite:** AERN 15740 and AERN 25250; and Aeronautics major.
**Corequisite:** AERN 35645.
**Schedule Type:** Flight Training
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

### AERN 35645  INSTRUMENT PILOT FLIGHT  2 Credit Hours
Comprehensive flight course for the professional pilot candidate to meet the requirements of the FAA instrument rating. This course may be repeated only once. Student is required to spend a minimum of two hours daily, five days a week, at the airport until all course requirements have been attained. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for a list of fees.
**Prerequisite:** Minimum C grade in AERN 25743; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
**Corequisite:** AERN 35644.
**Schedule Type:** Flight Training
**Contact Hours:** 2 lecture
**Grade Mode:** Standard Letter-IP

### AERN 35646  INSTRUMENT HELICOPTER FLIGHT  2 Credit Hours
Flight course designed to fulfill FAA requirements for the Instrument Helicopter Rating.
**Prerequisite:** AERN 15742 or 15743; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
**Corequisite:** AERN 35644.
**Schedule Type:** Flight Training
**Contact Hours:** 4.86 other
**Grade Mode:** Standard Letter-IP

### AERN 35647  COMMERCIAL PILOT FLIGHT II  2 Credit Hours
Comprehensive flight course for the professional pilot candidate once. Student is required to spend a minimum of two hours each day, four days a week, at the airport until course requirements have been attained. Special course fees may apply. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for a list of fees.
**Prerequisite:** Minimum C grade in AERN 35644; and AERN 35645; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
**Corequisite:** AERN 35746.
**Schedule Type:** Flight Training
**Contact Hours:** 2 lecture
**Grade Mode:** Standard Letter-IP

### AERN 35648  INSTRUMENT HELICOPTER FLIGHT ADD-ON  1 Credit Hour
Flight course designed to fulfill FAA requirements for the Instrument Helicopter Rating. This course may only be repeatable twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the FAA minimum requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Minimum FAA flight time requirements towards the Instrument Helicopter Flight Rating is 15 hours of actual or simulated instrument time. Actual flight training may exceed 15 hours.
**Prerequisite:** AERN 35645; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
**Corequisite:** AERN 35101.
**Schedule Type:** Flight Training
**Contact Hours:** 2.43 other
**Grade Mode:** Standard Letter-IP

### AERN 35650  NON-PILOT INSTRUMENT FLIGHT THEORY  3 Credit Hours
Course instruction for instrument flight to include: navigation facilities and equipment (both ground and aircraft), general weather theory and weather related to instrument meteorological conditions, weather charts and sources, FAA regulations pertinent to the conduct of instrument flight, aeronautical charts for instrument flight and techniques and procedures unique to the conduct of instrument flight. This course does not satisfy the Federal Aviation Regulation requirement for endorsement to take the Airman Knowledge Exam for an Instrument Rating nor does it satisfy the Aircraft Dispatch minor.
**Prerequisite:** AERN 15740 or AERN 15745; and AERN 25250.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter
AERN 35746 COMMERCIAL PILOT THEORY 2 Credit Hours
Comprehensive instruction covering all areas necessary to exercise the privileges of a commercial pilot.
Prerequisite: AERN 35644.
Corequisite: AERN 35647.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 35747 COMMERCIAL PILOT FLIGHT III 2 Credit Hours
Comprehensive flight course for the professional pilot candidate to meet the requirements of the FAA commercial pilot certificate. With special permission, this course may be repeated only once. Student is required to spend up to two hours daily, four days a week, at the airport until the course requirements been attained. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for a list of fees.
Prerequisite: Minimum C grade in AERN 35647; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 2 other
Grade Mode: Standard Letter-IP

AERN 35748 COMMERCIAL PILOT HELICOPTER FLIGHT ADD-ON 2 Credit Hours
Flight course designed to fulfill Federal Aviation Administration (FAA) requirements for the commercial pilot helicopter certificate. This course may only be repeatable twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the FAA minimum requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Minimum FAA flight time requirements towards the Commercial Pilot Helicopter Add-On Flight Certificate is 35 hours. Actual flight training may exceed 35 hours.
Prerequisite: AERN 35747; and AERN 15742 or AERN 15743; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Corequisite: AERN 35101.
Schedule Type: Combined Lecture and Lab
Contact Hours: 4.86 other
Grade Mode: Standard Letter-IP

AERN 35749 COMMERCIAL PILOT HELICOPTER FLIGHT 3 Credit Hours
Flight course designed to fulfill FAA requirements for the Commercial Pilot Helicopter certificate. This course may only be repeatable twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the FAA minimum requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Minimum FAA flight time requirements towards the Commercial Pilot Helicopter Flight Certificate is 150 hours. Actual flight training may exceed 150 hours.
Prerequisite: AERN 15742 or AERN 15743; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Corequisite: AERN 35746.
Schedule Type: Flight Training
Contact Hours: 5.5 other
Grade Mode: Standard Letter-IP

AERN 35810 UNMANNED AIRCRAFT SYSTEMS 3 Credit Hours
Provides an understanding of the theory of operation, architecture, and performance characteristics of various airborne-onboard systems and subsystems utilized in unmanned aerial vehicles. Also includes examination of aircraft materials, structural components, and configuration.
Prerequisite: AERN 25800.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35830 UNMANNED AIRCRAFT SYSTEMS SENSING AND SENSOR SYSTEMS 3 Credit Hours
An in-depth study of sensors and remote sensing systems used to support Unmanned Aircraft operations. Course emphasizes the theory, technical characteristics, capabilities, and operational use of various sensors and sensing systems. Course also investigates sensor data generation and sensing system image interpretation and analysis.
Prerequisite: AERN 25800.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 35840 UNMANNED AIRCRAFT SYSTEMS COMMAND, CONTROL AND COMMUNICATIONS 3 Credit Hours
Explores the technological and operational aspects of ground-based and airborne command, control, and communications systems used in unmanned aircraft systems. Topics include UAV sense-and-avoid systems, data link systems, voice communications systems, telemetry systems, navigation systems, and manual and automatic flight control systems.
Prerequisite: AERN 35644 or AERN 35650; and AERN 35810.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45001 INITIAL DISPATCH I 2 Credit Hours
Part I of III preliminary courses required for students not currently enrolled at Kent State University. Provided in order to meet Federal Aviation Regulation requirements under Part 65 for training to become an Aircraft Dispatcher. This course may be necessary as preliminary training to enroll in AERN 45010 and 45020 Aircraft Dispatch I and II respectively. Successful completion of Dispatch I and II results in authorization to take the FAA written and practical exams for the Aircraft Dispatcher certificate. Need for the course depends on previous coursework or FAA certificates completed.
Prerequisite: Special approval.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter
AERN 45002 INITIATIVE DISPATCH II 2 Credit Hours
Part II of III preliminary courses required for students not currently enrolled at Kent State University to enroll in Aircraft Dispatch I or Aircraft Dispatch II. This course is a continuation of training required by Part 65 of the Federal Aviation Regulations to earn an Aircraft Dispatcher Certificate. It may be required in order to meet the registration requirements for AERN 45010 and 45020. Aircraft Dispatch I and II of which successful completion results in authorization to take the FAA written and practical exams for the Aircraft Dispatcher Certificate. Need for the course depends on previous coursework or FAA certificates completed.
Prerequisite: Special approval.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 45003 INITIAL DISPATCH III 2 Credit Hours
Part III of III preliminary courses required for students not currently enrolled at Kent State University to enroll in Aircraft Dispatch I or Aircraft Dispatch II. This course is the final course to complete preliminary training required by Part 65 of the Federal Aviation Regulations to earn an Aircraft Dispatcher Certificate. It may be required in order to meet the registration requirements for AERN 45010 and 45020. Aircraft Dispatch I and II respectively, of which successful completion results in authorization to take the FAA written and practical exams for the Aircraft Dispatcher Certificate. Need for the course depends on previous coursework or FAA certificates completed.
Prerequisite: Special approval.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 45010 AIRCRAFT DISPATCH I 3 Credit Hours
This is the first of two courses required to qualify for the FAA Aircraft Dispatcher Airman Knowledge Test and the associated FAA Practical Exam for issuance of an Aircraft Dispatcher License. Topics include weather theory and weather services, regulations, aircraft systems, dispatch operations, decision making, human error, situational awareness, communications and aeronautical charts. Special course fees apply.
Prerequisite: AERN 35644 or AERN 35650.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45020 AIRCRAFT DISPATCH II 3 Credit Hours
Second of two courses designated for the practical application of previously acquired knowledge necessary to perform aircraft dispatcher functions. Topics as applied to dispatch functions include briefing techniques, preflight, weather analysis and flight planning. Required for an endorsement to take the FAA aircraft dispatcher practical test. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 45010.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45025 DISPATCH LABORATORY 1 Credit Hour
Practical Aircraft Dispatch application and preparation for the ADX written, oral and practical exam.
Prerequisite: AERN 45010.
Corequisite: AERN 45020.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

AERN 45030 AIRCRAFT SYSTEMS II 3 Credit Hours
Continuation of AERN 35040. An in-depth study of various aircraft systems including auxiliary systems, undercarriage, hydraulics, flight controls, instruments, and integrated systems as applied to aircraft.
Prerequisite: AERN 35040.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45040 LABOR RELATIONS IN THE AVIATION INDUSTRY 3 Credit Hours
Legislation governing labor relations in the private sector of the United States Economy consist of two separate and distinct pieces of legislation: the Railway Labor Act and the National Labor Relations Act. This course focuses on the examination of air transport labor relations in the context of these key laws. As the student of aviation management comes in contact with both Acts though this course, the student will learn similarities and differences of each and their resultant impact. The student will actively apply this knowledge in a mock labor relations negotiation.
Prerequisite: None.
Schedule Type: Practicum or Internship
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

AERN 45096 INDIVIDUAL INVESTIGATION IN AERONAUTICS 1-3 Credit Hours
(Repeatable for a total of 6 hours) Work experience in aerospace/aviation industry or related activity, laboratory or student professional organization.
Prerequisite: Special approval.
Schedule Type: Practicum or Internship
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

AERN 45092 AERONAUTICAL INTERNSHIP/COOPERATIVE EDUCATION (ELR) 1-3 Credit Hours
(Repeatable for a total of 6 hours) Work experience in aerospace/aviation industry or related activity, laboratory or student professional organization.
Prerequisite: Special approval.
Schedule Type: Practicum or Internship
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

AERN 45096 INDIVIDUAL INVESTIGATION IN AERONAUTICS 1-3 Credit Hours
(Repeatable for a maximum of 6 credit hours) Work study of an individual nature on a topic relating to professional aviation.
Prerequisite: Sophomore standing; and special approval.
Schedule Type: Individual Investigation
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP
AERN 45099  AERONAUTICAL STUDIES CAPSTONE (ELR)  3 Credit Hours
(Repeatable for credit) An in-depth study of the student's area of focus within aeronautical studies, culminating to a senior level project. At the discretion of the aeronautics faculty, students may substitute another capstone course for this course. Students must pass this capstone with a grade of C (2.000) or better in order to graduate.
Prerequisite: Senior standing.
Schedule Type: Senior Project/Honors Thesis
Contact Hours: 3 other
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

AERN 45100  AIRPORT OPERATIONS  3 Credit Hours
This course focuses on the daily functions of Airport Operations. Students receive hands-on training in performing daily inspections at the Kent State Airport to evaluate and keep track of airfield discrepancies. Students will use a database to address the Airport Certification Manual and FAR Part 139 criteria.
Prerequisite: AERN 35340.
Schedule Type: Lecture, Research
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45121  AEROSPACE PROPULSION FOR ENGINEERING AND ENGINEERING TECHNOLOGY  3 Credit Hours
An in-depth study of gas turbine engines, rockets, and hypersonic propulsion systems used in aerospace applications. Includes propulsion system design and operation, and the analysis of performance characteristics.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45130  PHYSIOLOGY AND HUMAN FACTORS OF FLIGHT  3 Credit Hours
A study of the interaction of the human body with flight and those human factors that affect flight operations.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45135  AVIATION SAFETY THEORY  3 Credit Hours
(Slashed with AERN 55135) An in-depth study of aviation human safety theories and the basics of risk and safety management.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45150  APPLIED FLIGHT DYNAMICS I  3 Credit Hours
(Slashed with AERN 55150) An applied aircraft flight dynamics course that demonstrates aircraft, engine and propeller performance with the overall flight performance and stability of the typical subsonic airplane. Emphasis is placed on the aerodynamics of flight.
Prerequisite: PHY 13001 or PHY 23101.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45151  APPLIED FLIGHT DYNAMICS II  3 Credit Hours
Aerodynamics, flight dynamics, and flight performance of high performance aircraft. Course includes supersonic aerodynamics, flight stability and handling, and an in-depth investigation and analysis of flight performance parameters including lift, drag, load factor, climb performance, and turn performance.
Prerequisite: AERN 45150.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

AERN 45200  STRATEGIC AVIATION MANAGEMENT (ELR)  3 Credit Hours
Serves as the capstone course for the aviation management area of concentration in aeronautics. As such, it is designed to address evolving issues and challenges in aviation management with a particular emphasis on airlines and airports through an application of previously mastered aviation management courses. Students must pass the course with a minimum grade of "C" (2.000).
Prerequisite: AERN 45100; and senior standing.
Schedule Type: Lecture, Research
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP
Attributes: Experiential Learning Requirement

AERN 45250  AVIATION LAW  3 Credit Hours
Involves a study of the origins of Western jurisprudence, common law and aviation law as an integral part of law in the U.S. Also introduces international aviation law by lateral agreement as well as U.S. Constitutional law and its amendments as they relate to the structure and process of aviation law. Criminal and civil law as they relate to civil aviation are also addressed. Case studies are included.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45300  AIR TRAFFIC CONTROL CAPSTONE (ELR)  3 Credit Hours
The culminating experience for the Air Traffic Control program of study. Students will work in groups to research and present a possible solution to a current event in the world of aviation and air traffic control. Students participate in realistic simulations where students take the roles within all three areas (Tower, TRACON, En Route). These scenarios often involve all three domains simultaneously where the students must work together to successfully finish the scenario, simulating a normal controller's day.
Prerequisite: AERN 45343 and AERN 45344; and Aeronautics major.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

AERN 45320  TERMINAL OPERATIONS II  2 Credit Hours
Advanced terminal course that focuses on the TRACON environment. Emphasis in vectoring and sequencing for approach at the primary airport. Topics covered will include, but not be limited to phraseology, maps, LOAs, and airspace.
Prerequisite: AERN 35342 and AERN 35345; and Aeronautics major.
Corequisite: AERN 45321.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter
AERN 45321  TERMINAL OPERATIONS II LABORATORY  1 Credit Hour
Application of terminal air traffic control operating principles explored in AERN 45320 Terminal Operations II.
Prerequisite: AERN 35342 and AERN 35345; and Aeronautics major.
Corequisite: AERN 45320.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

AERN 45340  AIRCRAFT MAINTENANCE  3 Credit Hours
Fundamentals of aircraft maintenance and resolving maintenance problems on the flight line.
Prerequisite: Aeronautics major; and Senior standing; and special approval.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

AERN 45343  EN ROUTE II  2 Credit Hours
Advanced en route course that focuses on low altitude, en route operations. Some time is spent on high altitude and special operations as well. Topics covered include, but not limited to phraseology, procedures, LOAs and maps.
Prerequisite: AERN 45320 and AERN 45321; and Aeronautics major.
Corequisite: AERN 45344.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 45344  EN ROUTE II LABORATORY  1 Credit Hour
Application of en route air traffic control operating principles explored in AERN 45343 En Route II.
Prerequisite: Aeronautics major.
Corequisite: AERN 45343.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

AERN 45349  SYSTEMS MAINTENANCE AND RELIABILITY  5 Credit Hours
Combines theories of systems and operations with practical experience to meet FAA standards for an airframe and powerplant license (300 hours shop experience).
Prerequisite: AERN 45340.
Corequisite: AERN 45343.
Schedule Type: Lecture
Contact Hours: 5 lecture
Grade Mode: Standard Letter

AERN 45350  AVIONICS  3 Credit Hours
(Slashed with AERN 55350) A study of aviation electronic systems in flight vehicles that pertain to communication, navigation and air traffic control systems.
Prerequisite: PHY 13001 and PHY 13012.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45360  PROFESSIONAL DEVELOPMENT IN AERONAUTICS III  1 Credit Hour
Seminar on selected topics relating to problems, issues and conditions of employment within aviation.
Prerequisite: AERN 30000; and senior standing.
Schedule Type: Lecture
Contact Hours: 1 lecture
Grade Mode: Standard Letter

AERN 45600  AIRCRAFT STABILITY AND CONTROL  3 Credit Hours
Three-dimensional rigid body dynamics, aircraft equations of motion, principles of static stability and control, dynamic stability of uncontrolled motion, gyroscopic instruments.
Prerequisite: Minimum C grade in AERN 25500 and AERN 35400.
Corequisite: AERN 45601.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

AERN 45601  AIRCRAFT STABILITY AND CONTROL LABORATORY  1 Credit Hour
Laboratory demonstrations and experiments for various aspects of aircraft stability and control.
Prerequisite: None.
Corequisite: AERN 45600.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

AERN 45648  THEORY OF FLIGHT INSTRUCTION (ELR)  3 Credit Hours
Detailed fundamentals of teaching flight and ground instruction and the analysis of flight techniques, in order to meet requirements of FAR's part 61.185(a).
Prerequisite: AERN 35040, AERN 35746, AERN 35747 and AERN 45150.
Corequisite: AERN 45649.
Schedule Type: Flight Training
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

AERN 45649  FLIGHT INSTRUCTOR/AIRPLANES  2 Credit Hours
Flight course with emphasis on instructing techniques in aircraft from right seat. Includes student evaluation techniques to meet Federal Aviation Regulation for certified flight instructor. With special approval, this course may be repeated only once. Student is required to spend a minimum of two hours daily, five days a week, at the airport until course requirements have been attained. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for a list of fees.
Prerequisite: AERN 35747; and minimum C grade in AERN 35746; and must be in the Flight Technology concentration in the Aeronautics major.
Corequisite: AERN 45648.
Schedule Type: Flight Training
Contact Hours: 9 other
Grade Mode: Standard Letter-IP

AERN 45650  CERTIFIED FLIGHT INSTRUCTOR HELICOPTER FLIGHT  2 Credit Hours
Flight course designed to fulfill FAA requirements for the Flight Instructor Helicopter certificate.
Prerequisite: AERN 35746 and AERN 35749; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Corequisite: AERN 45648.
Schedule Type: Flight Training
Contact Hours: 2.22 other
Grade Mode: Standard Letter-IP
AERN 45651 FLIGHT INSTRUCTOR-INSTRUMENTS  2 Credit Hours
Flight course with emphasis on flight instructing techniques involved with instrument flight and air traffic control procedures. With special approval this course may be repeated only once. Student is required to spend a minimum of two hours daily, three days a week, at the airport until course requirements have been met. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for more information.
Prerequisite: AERN 45649; and AERN 45648 with a minimum C grade; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 2 lecture, 9 other
Grade Mode: Standard Letter-IP

AERN 45652 CERTIFIED FLIGHT INSTRUCTOR INSTRUMENT
HELICOPTER FLIGHT  1 Credit Hour
Flight course designed to fulfill FAA requirements for the Flight Instructor Instrument Helicopter certificate. This course may only be repeated twice. Student is required to spend 1.5 hours each day, five days a week, at the airport, until the course requirements are attained. When not flying, the student goes through personalized ground instruction with an assigned flight instructor. Certified Flight Instructor Helicopter Certificate is 15 hours. Actual flight training may exceed 15 hours.
Prerequisite: AERN 35646 or AERN 35648; and AERN 45650 or AERN 45659; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 1.1 other
Grade Mode: Standard Letter-IP

AERN 45653 MULTI-ENGINE PILOT FLIGHT  1 Credit Hour
Course provides the required ground and flight instruction necessary to qualify students for the multi-engine rating from the FAA. With special approval this course may be repeated only once. Student is required to spend a minimum of two hours daily, three days a week, at the airport until course requirements have been attained. When not flying, the student goes through personalized ground instruction. Special course fees apply. Please visit www.kent.edu for more information.
Prerequisite: AERN 35747; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 1 lecture, 9 other
Grade Mode: Standard Letter-IP

AERN 45654 CERTIFIED FLIGHT INSTRUCTOR HELICOPTER FLIGHT
ADD-ON  1 Credit Hour
Flight course designed to fulfill FAA requirements for the Flight Instructor Helicopter Add-on certificate.
Prerequisite: AERN 45649; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 1.1 other
Grade Mode: Standard Letter-IP

AERN 45655 ADVANCED MULTI-ENGINE PILOT FLIGHT  1 Credit Hour
Ground flight instruction for proficiency and required hours in preparation for multi-engine instruction. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 45653; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 9 other
Grade Mode: Standard Letter-IP

AERN 45656 CERTIFIED FLIGHT INSTRUCTOR INSTRUMENT
HELICOPTER FLIGHT ADD ON  1 Credit Hour
Flight course designed to fulfill FAA requirements for the Flight Instructor Instrument Helicopter Add-on certificate.
Prerequisite: AERN 45651; and 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 1.1 other
Grade Mode: Standard Letter-IP

AERN 45657 MULTI-ENGINE FLIGHT INSTRUCTOR  1 Credit Hour
Course provides the necessary ground and flight instruction to professionally qualify students for the multi-engine instructor rating by the FAA. This course may be repeated only twice. Student is required to spend two hours daily, three days a week, at the airport. When not flying, the student goes through personalized ground instruction with the flight instructor. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 45649 and AERN 45655; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 9 other
Grade Mode: Standard Letter-IP

AERN 45659 UPSET RECOVERY TRAINING  1 Credit Hour
Consisting of both ground school and hands-on flight components, this upset training course prepares pilots for emergency situations they may encounter that cannot properly be replicated in a typical GA aircraft. Comprehensive pilot training on the Extensive piston driven and swept wing jet aerodynamic characteristics, accident analysis and recovery profile. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 15741; and minimum 2.500 overall GPA; and must be in the Flight Technology concentration in the Aeronautics major.
Schedule Type: Flight Training
Contact Hours: 9 other
Grade Mode: Standard Letter

AERN 45700 AIRCRAFT DESIGN (ELR)  3 Credit Hours
(Slashed with AERN 55700) First of a two-course series of aerospace design. Preliminary design or case study of an aerospace vehicle, including but not limited to, aircraft, rotorcraft and spacecraft. Primary focus on introduction to design, decision-making in design and preliminary sizing of an aerospace vehicle to meet customer requirements. Final technical report and presentation.
Prerequisite: (AERN 45030 and AERN 45150 and AERN 45121) or (AERN 35300 and AERN 35500 and AERN 45121).
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement
AERN 45710  TURBINE ENGINE THEORY AND OPERATION  2 Credit Hours
An in-depth study of the theory, operation and performance of turbine turboprop engines and associated systems.
Prerequisite: AERN 35020.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 45711  TURBINE ENGINE THEORY AND OPERATION LABORATORY  1 Credit Hour
Laboratory using a turboprop flight simulator to provide instruction and demonstration of the operating characteristics and procedures associated with turbine/turboprop engines. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 35020; and Aeronautics major.
Pre/corequisite: AERN 45710.
Schedule Type: Private Lesson
Contact Hours: 1 other
Grade Mode: Standard Letter

AERN 45720  CREW RESOURCE MANAGEMENT  2 Credit Hours
An in-depth study of the common principles of aviation crew resource management (CRM) and human factors as utilized by air transport flight crews.
Prerequisite: AERN 45130.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter-IP

AERN 45721  CREW RESOURCE MANAGEMENT LABORATORY  1 Credit Hour
Flight simulator-based laboratory that includes flight simulator experiences that integrate crew resource management (CRM) and line-oriented flight training (LOFT) in a multicrew environment. Special course fees may apply. Please visit www.kent.edu/caest/flight-technology and click on the Flight Course Fees link for more information.
Prerequisite: AERN 45130.
Pre/corequisite: AERN 45720.
Schedule Type: Combined Lecture and Lab
Contact Hours: 1 other
Grade Mode: Standard Letter-IP

AERN 45730  APPLIED TRANSPORT CATEGORY AIRCRAFT SYSTEMS  3 Credit Hours
Course examines various systems in use on air transport aircraft. The course emphasis is on the principles, operation and limitations of complex, integrated systems found in modern aircraft.
Prerequisite: AERN 35020.
Corequisite: AERN 45030.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 45740  FLIGHT MANAGEMENT SYSTEMS  3 Credit Hours
Course examines various advanced avionics systems used on air transport type aircraft. The course emphasis is on the principles, operation and limitations of integrated avionics related to the "glass cockpit" found on modern aircraft.
Prerequisite: AERN 45030 and AERN 45350.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

AERN 45791  AVIATION SECURITY AND POLICY SEMINAR (WIC)  3 Credit Hours
(Slashed with AERN 55791) Examines policies, practices, procedures and regulatory provisions developed to create and enhance security in civil aviation with a special emphasis on airlines, airports, airspace and agencies responsible for civil aviation security.
Prerequisite: AERN 45250.
Schedule Type: Seminar
Contact Hours: 3 other
Grade Mode: Standard Letter
Attributes: Writing Intensive Course
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<td>AERN 55150</td>
<td>APPLIED FLIGHT DYNAMICS I</td>
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<td>AERN 55350</td>
<td>AVIONICS</td>
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<td>AERN 55700</td>
<td>AIRCRAFT DESIGN</td>
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<tr>
<td>AERN 55791</td>
<td>AVIATION SECURITY AND POLICY SEMINAR</td>
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<td>AERN 61091</td>
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<td>AERN 65100</td>
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<td>AERN 65200</td>
<td>AVIATION ECONOMICS AND FISCAL MANAGEMENT</td>
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**AERN 55150 APPLIED FLIGHT DYNAMICS I**
(Slashed with AERN 45150) An applied aircraft flight dynamics course that demonstrates aircraft, engine and propeller performance with the overall flight performance and stability of the typical subsonic airplane. Emphasis is placed on the aerodynamics of flight.

**Prerequisite:** AERN 15000; and MATH 11012 or MATH 12002; and PHY 13001 and PHY 13002 (or PHY 23101 and PHY 23102); and graduate standing.

**Schedule Type:** Combined Lecture and Lab

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter

**AERN 55350 AVIONICS**
(Slashed with AERN 45350) A study of aviation electronic systems in flight vehicles that pertain to communication, navigation and air traffic control systems.

**Prerequisite:** PHY 13001 and PHY 13012; and graduate standing.

**Schedule Type:** Combined Lecture and Lab

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**AERN 55700 AIRCRAFT DESIGN**
(Slashed with AERN 45700) First of a two-course series of aerospace design. Preliminary design or case study of an aerospace vehicle, including but not limited, to aircraft, rotorcraft and spacecraft. Primary focus on introduction to design, decision-making in design and preliminary sizing of an aerospace vehicle to meet customer requirements. Final technical report and presentation.

**Prerequisite:** Graduate standing.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**AERN 55791 AVIATION SECURITY AND POLICY SEMINAR**
(Repealble for credit) (Slashed with AERN 45791) Examines policies, practices, procedures and regulatory provisions developed to create and enhance security in civil aviation with a special emphasis on airlines, airports, airspace and agencies responsible for civil aviation security.

**Prerequisite:** Graduate standing.

**Schedule Type:** Seminar

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter

**AERN 61091 AEROSPACE SEMINAR**
(Repeatable for a maximum of three semesters) Discussions of selected technical topics related to aerospace technology.

**Prerequisite:** Graduate standing.

**Schedule Type:** Seminar

**Contact Hours:** 1 other

**Grade Mode:** Standard Letter

**AERN 65091 SEMINAR IN EMERGING ISSUES IN AVIATION LOGISTICS**
(Repeatable for credit) Up to 6 total credit hours of practicum to gain experience in the aerospace or aviation industry managing various aspects of logistics. Logistic projects related to systems analysis, product or vehicle movement, legal and ethical issues, economic issues, international needs, safety, human resources and managerial assessment, or other aspects of managing logistics as approved are the focus of the course.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Practicum or Internship

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter-IP

**AERN 65100 LOGISTICAL STRATEGIES IN AVIATION MANAGEMENT**
(Repeatable for credit) Up to 6 total credit hours of practicum to gain experience in the aerospace or aviation industry managing various aspects of logistics. Logistic projects related to systems analysis, product or vehicle movement, legal and ethical issues, economic issues, international needs, safety, human resources and managerial assessment, or other aspects of managing logistics as approved are the focus of the course.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Practicum or Internship

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter-IP

**AERN 65150 LEGAL AND REGULATORY ISSUES FOR AIR CARGO MANAGEMENT**
(Repeatable for credit) Up to 6 total credit hours of practicum to gain experience in the aerospace or aviation industry managing various aspects of logistics. Logistic projects related to systems analysis, product or vehicle movement, legal and ethical issues, economic issues, international needs, safety, human resources and managerial assessment, or other aspects of managing logistics as approved are the focus of the course.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Practicum or Internship

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter-IP

**AERN 65199 THESIS I**
(Repeatable for credit) Up to 6 total credit hours of practicum to gain experience in the aerospace or aviation industry managing various aspects of logistics. Logistic projects related to systems analysis, product or vehicle movement, legal and ethical issues, economic issues, international needs, safety, human resources and managerial assessment, or other aspects of managing logistics as approved are the focus of the course.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Practicum or Internship

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter-IP

**AERN 65200 AVIATION ECONOMICS AND FISCAL MANAGEMENT**
(Repeatable for credit) Up to 6 total credit hours of practicum to gain experience in the aerospace or aviation industry managing various aspects of logistics. Logistic projects related to systems analysis, product or vehicle movement, legal and ethical issues, economic issues, international needs, safety, human resources and managerial assessment, or other aspects of managing logistics as approved are the focus of the course.

**Prerequisite:** Graduate standing; and special approval.

**Schedule Type:** Practicum or Internship

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter-IP
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<th>Course Code</th>
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<tbody>
<tr>
<td>AERN 65201</td>
<td>AVIATION INDUSTRY CONTRACT MANAGEMENT</td>
<td>2</td>
<td>The course provides students with practical experience in the realm of aviation contracts.</td>
<td>MIS 64041; and graduate standing.</td>
<td>Lecture</td>
<td>2 lecture</td>
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<tr>
<td>AERN 65230</td>
<td>MODELING AND FORECASTING FOR AVIATION LOGISTICS PLANNING</td>
<td>2</td>
<td>This course presents topics and techniques necessary to understand and develop an aviation logistics model such that an accurate and effective aviation demand forecast can be made.</td>
<td>AERN 65100 and AERN 65200; and graduate standing.</td>
<td>Lecture</td>
<td>2 lecture</td>
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<tr>
<td>AERN 65235</td>
<td>HUMAN ERROR ANALYSIS IN AVIATION</td>
<td>2</td>
<td>Provides an in-depth look at human error and its implications in the realm of safety using examples from the aviation industry. Includes a basic overview of human error, discussion on the models available to examine error, provides knowledge on how to classify and provide recommendations of intervention strategies. A focus will be on the SHELL Model, the Human Factors Analysis and Classification System, and the 5M model. This course will use real examples of accidents and incidents for students to apply these strategies.</td>
<td>AERN 65250; and graduate standing.</td>
<td>Lecture</td>
<td>2 lecture</td>
<td>Standard Letter</td>
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<tr>
<td>AERN 65240</td>
<td>AVIATION SAFETY MANAGEMENT SYSTEMS</td>
<td>3</td>
<td>An in-depth study of the concepts and principles of aviation safety management and aviation Safety Management Systems (SMS). Provides a fundamental knowledge of SMS safety policy, safety risk management, safety assurance, and safety promotion. Also includes a thorough analysis of the design, implementation, and management of Safety Management Systems and its incorporation into various aviation sectors.</td>
<td>AERN 65199; and graduate standing.</td>
<td>Lecture</td>
<td>3 lecture</td>
<td>Standard Letter</td>
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<tr>
<td>AERN 65250</td>
<td>APPLIED HUMAN FACTORS ENGINEERING</td>
<td>3</td>
<td>Survey of human factors engineering and ergonomics, emphasizing the human-centered approach to systems, product, workplace, and machine design. Discussions will include human factors research and design methodologies, human factors fundamentals (e.g., sensation and perception, information processing, anthropometry) and applications of human factors for the design of workplace and environment.</td>
<td>AERN 65250; and graduate standing.</td>
<td>Lecture</td>
<td>3 lecture</td>
<td>Standard Letter</td>
</tr>
<tr>
<td>AERN 65270</td>
<td>HUMAN FACTORS IN SYSTEMS DESIGN</td>
<td>3</td>
<td>Human factors input into operator-system design, development, testing, and evaluation. Emphasis on the systems approach to human-machine-interface, with discussion and application of specific methodologies and analytical techniques. Highly focus on design of display and control systems.</td>
<td>AERN 65250; and graduate standing.</td>
<td>Lecture</td>
<td>3 lecture</td>
<td>Standard Letter</td>
</tr>
<tr>
<td>AERN 65280</td>
<td>HUMAN INFORMATION PROCESSING</td>
<td>3</td>
<td>An examination of human information reception, information processing, and skilled performance capabilities and limitations in human-matching systems with an emphasis on models and techniques including psychophysics, signal detection theory, information theory, and decision-making theory.</td>
<td>AERN 65250; and graduate standing.</td>
<td>Lecture</td>
<td>3 lecture</td>
<td>Standard Letter</td>
</tr>
<tr>
<td>AERN 65299</td>
<td>THESIS II</td>
<td>2</td>
<td>Thesis students must continue registration each semester until all degree requirements are met.</td>
<td>AERN 65199; and graduate standing.</td>
<td>Masters Thesis</td>
<td>2 other</td>
<td>Satisfactory/Unsatisfactory-IP</td>
</tr>
<tr>
<td>AERN 65300</td>
<td>AIRLINE TRANSPORTATION OPERATIONS</td>
<td>3</td>
<td>This course provides a managerial approach that highlights the importance of airline transportation. Students examine the framework for airline transportation from a micro and macro perspective. The focus is on operations management that is specialized or unique to the airline industry including regulation and public policy, as they overview operations, service and cost structure.</td>
<td>AERN 65199; and graduate standing.</td>
<td>Lecture</td>
<td>3 lecture</td>
<td>Standard Letter</td>
</tr>
<tr>
<td>AERN 65301</td>
<td>AIR CARGO SECURITY</td>
<td>2</td>
<td>This course examines Post 9-11 legislation put in place with respect to air cargo security and details unique challenges facing the industry today with an eye toward management of those challenges for future growth.</td>
<td>AERN 65199; and graduate standing.</td>
<td>Lecture</td>
<td>2 lecture</td>
<td>Standard Letter</td>
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</tbody>
</table>
AERN 65400 WEATHER FOR AVIATION LOGISTICS PLANNING 2 Credit Hours
Introduction to weather concepts as related to aviation operations management. This course focuses on the effect of various phenomena on airport, airline, and small aircraft feeder operations. The emphasis is on understanding conditions that produce various phenomena, use of available weather products to determine conditions and hazardous conditions and their likely impact on aviation operations. An understanding of regulations relative to weather operations and aircraft capabilities will be gained. Regional weather is discussed.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 2 lecture
Grade Mode: Standard Letter

AERN 65496 INDIVIDUAL INVESTIGATION IN AERONAUTICS 1-4 Credit Hours
(Repeatable for a maximum of 9 credit hours) Individual investigation of various aeronautics-related topics.
Prerequisite: Graduate standing and special approval.
Schedule Type: Individual Investigation
Contact Hours: 1-4 other
Grade Mode: Standard Letter-IP

AERN 65499 CAPSTONE IN AERONAUTICS 2 Credit Hours
The Capstone is a culminating experience that will require completion of a comprehensive project at a workplace through employment or internship, or, a comprehensive research paper from an investigation. The goal is to demonstrate competence in aviation management and logistics. Possibilities include empirical research, case studies, theoretical or applied projects or projects for identified clients. The student will be evaluated on the use of knowledge and skills gained from other courses taken in the degree program.
Prerequisite: TECH 60001, TECH 60003, TECH 60078, AERN 65091, AERN 65100, AERN 65200, AERN 65150, MIS 64005, MIS 64041 and MIS 64042.
Schedule Type: Project or Capstone
Contact Hours: 2 other
Grade Mode: Standard Letter

Technology (TECH)

TECH 10001 INFORMATION TECHNOLOGY 3 Credit Hours
Introduction to the operation and use of computer systems in technology-related applications. Laboratory assignments include the use of microcomputers for solving technical problems.
Prerequisite: None.
Schedule Type: Laboratory, Lecture
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 13580 ENGINEERING GRAPHICS I 3 Credit Hours
Technique of engineering drawing, lettering, instrument use, freehand drawing, orthogonal projection, sections, single and double auxiliaries, dimensioning, screw threads, charts and graphs.
Prerequisite: None.
Schedule Type: Laboratory, Lecture
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 20001 ENERGY/POWER 3 Credit Hours
Study of basic thermodynamic laws and how they apply to the conversion and transfer of heat energy into useful power.
Prerequisite: TECH 21020 and TECH 21022.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 20002 MATERIALS AND PROCESSES 3 Credit Hours
Study and practice addressing the nature of basic manufacturing materials and the processes by which they are converted into manufactured products. Includes laboratory experience.
Prerequisite: None.
Schedule Type: Laboratory, Lecture
Contact Hours: 2 lecture, 4 lab
Grade Mode: Standard Letter

TECH 20003 FUNDAMENTALS OF CIRCUIT ANALYSIS 3 Credit Hours
Analysis of DC and AC electrical circuits consisting of resistive and reactive components using the basic circuit theorems, descriptions of AC signals in terms of phasors, power and resonance in electrical circuits, transformers and polyphase systems.
Prerequisite: PHY 23102.
Schedule Type: Laboratory, Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 20005 INTRODUCTION TO CYBERSECURITY 3 Credit Hours
This course will introduce the students to the fundamentals of Cybersecurity. Students will be able to develop an understanding of cybercrime, security principles, technologies, and procedures used to defend networks. This course will also explore cyber trends, threats, personal privacy.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 21020 SURVEY OF ELECTRICITY AND ELECTRONICS 3 Credit Hours
Survey of DC and AC circuits, semiconductors and electronic devices, including microprocessors and embedded systems.
Prerequisite: MATH 11022 and PHY 13002.
Corequisite: TECH 21022.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 21022 SURVEY OF ELECTRICITY AND ELECTRONICS LABORATORY 1 Credit Hour
Laboratory experiments related to the course TECH 21020.
Prerequisite: MATH 11022 and PHY 13002.
Corequisite: TECH 21020.
Schedule Type: Laboratory
Contact Hours: 2 lab
Grade Mode: Standard Letter

TECH 22095 SPECIAL TOPICS IN TECHNOLOGY 1-4 Credit Hours
(Repeatable for credit) Topics to be announced in the schedule of classes, offering current topics in technology based areas of study.
Prerequisite: Special approval.
Schedule Type: Combined Lecture and Lab
Contact Hours: 1-4 other
Grade Mode: Standard Letter-IP
TECH 23010  COMPUTER HARDWARE     3 Credit Hours
Introduction to the hardware, architecture and operation of the personal
computer and associated devices. Topics include personal computer
architecture and operation fundamentals; basic hardware; data
buses and ports; hardware component packaging; auxiliary hardware
components; computer assembly; basic hardware installation and
configuration; and basic troubleshooting. This course is aligned with A+
content. CompTIA A+ is the preferred qualifying credential for technical
support and IT operational roles.
Prerequisite: DSCI 26010 or TECH 26010.
Schedule Type: Lecture, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 23581  COMPUTER-AIDED ENGINEERING GRAPHICS     3 Credit Hours
Study of working drawings, descriptive geometry, geometrical tolerancing,
structural/weldments, cams, gears, piping and considerable time with the
Hewlett Packard 900 CAD system.
Prerequisite: TECH 10001 or TECH 26010; and TECH 13580.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 26010  INTRODUCTION TO COMPUTER ENGINEERING
TECHNOLOGY     3 Credit Hours
Describes Computer Engineering Technology concepts and principles.
Topics include computer hardware, computer hardware operations,
digital systems design, networking hardware, technology of networking,
computer aided design and embedded systems.
Pre/corequisite: MATH 11022.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 26200  PROGRAMMING FOR ENGINEERS I     3 Credit Hours
Introduction to engineering problem solving and use of programming
language to solve those problems. Students are expected to develop
basic mathematical modeling and engineering problem solving skills
using mathematical tools and programming languages. Developing
modeling and logical thinking are the core objective of this course.
Prerequisite: Sophomore standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 26301  NETWORKING HARDWARE I     4 Credit Hours
A hands-on, applied engineering-focused course emphasizing the
operation, maintenance, and performance aspects of personal computer
networking hardware. Topics include networking hardware operation,
characteristics, configuration, and troubleshooting fundamentals. Course
also includes network standards, protocols, configuration, topologies, and
administrative fundamentals as related to networking hardware systems.
Prerequisite: TECH 21020 and TECH 21022; or DSCI 26010 or
TECH 26010.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 4 lab
Grade Mode: Standard Letter

TECH 26310  WEB DESIGN AND DEVELOPMENT     3 Credit Hours
An introduction to Web Programming. Concepts, principles, techniques,
and methods associated with the design and implementation of Web
pages and Internet-based applications. Includes fundamentals of web
site and web page creation, development, and maintenance; Web page
programming languages; Web design software and production tools;
creation of dynamic, interactive web-based multimedia presentations;
and Web client and server technologies.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 27210  INTRODUCTION TO SUSTAINABILITY     3 Credit Hours
Introduces the students to the concepts of sustainability and its three
pillars, namely, economic growth, environmental protection, and social
equality. Students taking the course will understand the language and
concepts of sustainability and will acquire the knowledge to further study
sustainability.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 31000  CULTURAL DYNAMICS OF TECHNOLOGY (DIVD) (WIC)
3 Credit Hours
Study of technology and the forces it exerts upon society.
Prerequisite: ENG 21011.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
Attributes: Diversity Domestic, Writing Intensive Course

TECH 31010  ENGINEERING AND PROFESSIONAL ETHICS     3 Credit Hours
Applications of codes of ethics in the engineering and technology
professions reflective of social and moral responsibilities to the public,
and accountability in engineering practice.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 31016  MANUFACTURING TECHNOLOGY     3 Credit Hours
Classroom, laboratory and field experiences involving the major aspects
of a manufacturing enterprise including product design, production
financing and marketing.
Prerequisite: TECH 10001 and TECH 13580 and TECH 20002.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 31020  AUTOMATED MANUFACTURING     3 Credit Hours
Theory and operation of computer controlled machine tools, robots and
processes.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
TECH 32105 CONSTRUCTION JOBSITE MANAGEMENT 3 Credit Hours
Course concentrates on the procedures and methods that are used by the construction contractor during the construction and post-construction phases of a project.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 33010 COMPUTER HARDWARE FOR ANIMATION 3 Credit Hours
Students will gain a complete, step-by-step approach for learning the fundamentals of supporting and troubleshooting computer hardware. Throughout this course, students will learn the technical skills for PC configuration and troubleshooting. Finally, the students will be exposed to the concepts of Animation and Design through exploring Deep learning concepts, GPUs benchmark tests, peripherals and gaming platforms.
Prerequisite: Junior standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 33016 PC/NETWORK ENGINEERING AND TROUBLESHOOTING 3 Credit Hours
Covers the service, maintenance, upgrade and optimization of personal computers. Specification, installation and maintenance of local area networks are covered. Students learn communication protocols and network architecture. Two lectures and two labs a week.
Prerequisite: EERT 22014 or TECH 33010.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

TECH 33020 COMPUTER HARDWARE II 3 Credit Hours
An in-depth look at personal computer design and hardware components, and an introduction to the fundamentals of personal computer networks. Topics include the operation, assembly, configuration, diagnosis, and unit-level troubleshooting of personal computers and their associated hardware components. Also includes an introduction to PC network configuration, hardware, and troubleshooting fundamentals.
Prerequisite: TECH 23010.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 33030 COMPUTER PERIPHERALS AND SPECIAL USE HARDWARE 3 Credit Hours
Operation, installation, hardware configuration, software configuration, fault analysis, troubleshooting, and repair of various peripheral devices, interface cards, and special use hardware components used by personal computers.
Prerequisite: TECH 23010 and TECH 26301.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 3071 WOODS TECHNOLOGY II 2 Credit Hours
Emphasis on basic woodworking machinery processes, fundamental construction and materials. Project design and development.
Prerequisite: ID 24023.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 31071 MACHINING TECHNOLOGY I 3 Credit Hours
Lecture and laboratory experiences in basic machine tool principles and processes.
Prerequisite: None.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 31067 MACHINING TECHNOLOGY I 3 Credit Hours
Lecture and laboratory experiences in basic machine tool principles and processes.
Prerequisite: None.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 31065 CAST METALS 3 Credit Hours
Principles and processes of metal casting with a focus on current industrial practices. Includes laboratory experience with nonferrous metals and industrial tours.
Prerequisite: TECH 20002.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

TECH 31043 PRINCIPLES OF CONCRETE CONSTRUCTION 3 Credit Hours
An introductory course on the use of concrete in the construction industry. Students gain a basic understanding of the strength and behavior of reinforced concrete members and simple reinforced concrete structural systems.
Prerequisite: CMGT 21071.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 31032 POWER TECHNOLOGY 3 Credit Hours
Principles of energy conversion and power application. Overview of basic heat engines, machines and transmission devices. Alternative energy systems and conservation techniques.
Prerequisite: TECH 20001 and TECH 20004.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Contact Hours</th>
<th>Schedule Type</th>
<th>Prerequisite</th>
<th>Grade Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECH 33031</td>
<td>PROGRAMMABLE LOGIC CONTROLLERS</td>
<td>3 Credit Hours</td>
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<td>TECH 33032</td>
<td>PROGRAMMABLE LOGIC CONTROLLERS II</td>
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<tr>
<td>TECH 33033</td>
<td>HYDRAULICS/PNEUMATICS</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33040</td>
<td>CONTROL SYSTEMS</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33095</td>
<td>SPECIAL TOPICS: APPLIED SCIENCE AND TECHNOLOGY</td>
<td>1-3 Credit Hours</td>
<td></td>
<td>(Repeatable for credit) Special topics of immediate interest in applied science and technology.</td>
<td>Standard Letter</td>
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<tr>
<td>TECH 33111</td>
<td>STATICS AND STRENGTH OF MATERIALS</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33220</td>
<td>ELECTRONIC DEVICES</td>
<td>4 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33222</td>
<td>DIGITAL DESIGN FOR COMPUTER ENGINEERING</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33223</td>
<td>ELECTRONIC COMMUNICATION</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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<tr>
<td>TECH 33225</td>
<td>INDUSTRIAL CONTROL SYSTEMS</td>
<td>3 Credit Hours</td>
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<td>Standard Letter</td>
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</tbody>
</table>

**Course Descriptions**

**TECH 33031 PROGRAMMABLE LOGIC CONTROLLERS**

An introduction to programmable logic controllers (PLCs) covering hardware, ladder logic programming, networking and communications. Programming timers, counters and sequencers and an introduction to human machine interfaces (HMS).

**Prerequisite:** TECH 10001, TECH 21020 and TECH 21022.

**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab

**Contact Hours:** 3 other

**Grade Mode:** Standard Letter

**TECH 33032 PROGRAMMABLE LOGIC CONTROLLERS II**

Advanced principles and applications of programmable logic controllers with a focus on using sequential function charts to control complex industrial processes. Includes real time control issues, PLC networking, programming languages other than ladder logic, standards, motion control, supervisory control and data acquisition, process control, alarm management, power failure strategies and safety.

**Prerequisite:** TECH 33031.

**Schedule Type:** Combined Lecture and Lab

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33033 HYDRAULICS/PNEUMATICS**

Fluid properties, hydraulic design, viscosity, hydraulic components, pumps, systems and circuits, maintenance and safety, pneumatics, air systems control and design.

**Prerequisite:** PHY 13001 or PHY 23101.

**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33040 CONTROL SYSTEMS**

Analysis of mathematical models of feedback control systems. Includes introduction to basic control system terms and devices, open loop and closed loop control, Laplace transforms, static and dynamic response, stability and performance of control systems, frequency response analysis, Bode plot, root locus.

**Prerequisite:** MATH 12002; and TECH 20004 or TECH 21020 (and TECH 21022).

**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33095 SPECIAL TOPICS: APPLIED SCIENCE AND TECHNOLOGY**

(Repeatable for credit) Special topics of immediate interest in applied science and technology.

**Prerequisite:** Junior standing; and special approval.

**Schedule Type:** Lecture

**Contact Hours:** 1-3 lecture

**Grade Mode:** Standard Letter

**TECH 33111 STATICS AND STRENGTH OF MATERIALS**

An algebra based analytical study of equilibrium of extended 2-dimensional bodies, the concepts of elastic and thermal properties of materials, centroid and moment of inertia, and the relationship between the external forces applied to extended objects (generally beams and columns) and the resulting bending and shear stresses, the resulting strains and deformation of the object.

**Prerequisite:** PHY 13001 or PHY 23101.

**Schedule Type:** Lecture

**Contact Hours:** 3 lecture

**Grade Mode:** Standard Letter

**TECH 33220 ELECTRONIC DEVICES**

Introduction to electronic non-linear devices including, diodes, transistors, optoelectronic devices and operational amplifiers. Use and application of these devices in different types of application like rectifiers, amplifiers and linear integrated circuits.

**Prerequisite:** TECH 20004.

**Schedule Type:** Laboratory, Lecture

**Contact Hours:** 3 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33222 DIGITAL DESIGN FOR COMPUTER ENGINEERING**

Introduction to digital design. The operation and use of digital devices and components as used in microprocessors and digital computers. Topics include binary arithmetic operations, Boolean algebra, logic gates, combinational and sequential logic, buffers, registers, memory devices. Students are exposed to applied problem solving via basic programming with microcontrollers and microprocessors.

**Prerequisite:** TECH 21020.

**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33223 ELECTRONIC COMMUNICATION**

Principles of digital and analog telecommunications and data signals. Topics include electromagnetic signal time and frequency characteristics, signal propagation, signal modulation, transmission lines, wireless signals, antennas, digital signal characteristics and protocols, signal multiplexing, microwave devices and applications.

**Prerequisite:** TECH 21020 and TECH 21022.

**Schedule Type:** Combined Lecture and Lab

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter

**TECH 33225 INDUSTRIAL CONTROL SYSTEMS**

The application of electronics to the control of industrial machines and processes. Includes laboratory.

**Prerequisite:** TECH 33220.

**Schedule Type:** Laboratory, Lecture

**Contact Hours:** 2 lecture, 2 lab

**Grade Mode:** Standard Letter
**TECH 3320  APPLIED EMBEDDED SYSTEMS I**  3 Credit Hours
Course builds upon the content of several other applied engineering courses to establish a foundation for students to utilize embedded systems for engineering problem solving. Students are exposed to the history of the microcontroller that is at the heart of modern embedded systems. Student learn about the different classes of embedded systems and form a foundation from which they can begin to develop solutions to simple, but real-world, problems using simple embedded microcontrollers, electronic devices and sensors. Basic coding principals are explained from an engineering problem-solving perspective.
**Prerequisite:** TECH 21020, TECH 21022, TECH 26200 and TECH 33222.
**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab
**Contact Hours:** 2 lecture, 2 lab
**Grade Mode:** Standard Letter

**TECH 3333  INDUSTRIAL ROBOTICS**  3 Credit Hours
Classification, characteristics, and functions of industrial robots. Covers basic safety precautions for working with robots. Laboratory time will be spent programming FANUC industrial robots and utilizing FANUC robot teach pendants. Students will have the opportunity to obtain a FANUC Robotics Handling Tool Operation and Programming Certificate of Completion.
**Prerequisite:** PHY 13002.
**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab
**Contact Hours:** 2 lecture, 2 lab
**Grade Mode:** Standard Letter

**TECH 3336  MATERIALS SCIENCE AND TECHNOLOGY**  3 Credit Hours
Scientific study of modern manufacturing materials (metals, plastics and ceramics) and the laboratory test methods used to determine their manufacturing specifications and properties.
**Prerequisite:** Junior standing.
**Schedule Type:** Combined Lecture and Lab
**Contact Hours:** 3 other
**Grade Mode:** Standard Letter

**TECH 3357  INTRODUCTION TO LEAN SIX SIGMA**  3 Credit Hours
An introduction to lean six sigma. Including understanding the systems, measuring and defining performance, analyzing, improving, and controlling processes, and leading six sigma initiatives.
**Prerequisite:** MATH 11010.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

**TECH 3370  QUALITY TECHNIQUES**  3 Credit Hours
Introduction to quality management and the tools and techniques including the basic tools identified by ASQ (American Society for Quality) as well as an introduction to Lean and Six Sigma. Information presented helps prepare the student to qualify for the Quality Process Analyst Certification.
**Prerequisite:** None.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

**TECH 3370  FACILITY DESIGN AND MATERIAL HANDLING**  3 Credit Hours
Provides students with a fundamental understanding of how layout affects the flow through a system. Both qualitative and quantitative tools are presented for complete approach to facility design and material handling.
**Prerequisite:** Junior standing.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

**TECH 3400  ADVANCED COMPUTER-AIDED DESIGN II**  3 Credit Hours
Continuation of MAGC 22000 with an emphasis on the use of a Parametric-based CAD software (Pro/Engineer) for the design and modeling of industrial products.
**Prerequisite:** MAGC 22000 and MERT 12001; or TECH 23581.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

**TECH 3576  QUALITY AND RELIABILITY ENGINEERING**  3 Credit Hours
Introduction to reliability and quality engineering with an emphasis on manufacturing and techniques for improving quality and reliability. Includes reliability, reliability prediction, quality techniques, modeling statistical process control, control charts, sampling, experimental design, and designing and manufacturing for quality and reliability.
**Prerequisite:** MATH 11010.
**Schedule Type:** Lecture
**Contact Hours:** 3 lecture
**Grade Mode:** Standard Letter

**TECH 3620  PROGRAMMING FOR ENGINEERS II**  3 Credit Hours
Emphasizes engineering problems and applications of programming language and mathematical tools to analyze and solve them. Students are expected to learn problem solving techniques, modeling, simulation, presentation of engineering application oriented problems using programming languages. Advanced modeling, simulations and analysis are the core objective of this course.
**Prerequisite:** TECH 26200; and junior standing.
**Schedule Type:** Laboratory, Lecture, Combined Lecture and Lab
**Contact Hours:** 2 lecture, 2 lab
**Grade Mode:** Standard Letter

**TECH 3630  NETWORKING HARDWARE II**  3 Credit Hours
Continuation of TECH 26301. In-depth coverage of personal computer-based enterprise networking systems hardware with a focus on network hardware and software configuration, fault analysis, diagnostics, and troubleshooting. Topics include router and switch operation, programming, configuration, and troubleshooting, along with overall enterprise network maintenance, troubleshooting, and repair. Course also includes WAN and VLAN fundamentals, intermediate TCP/IP and network administration and maintenance as related to fielding and maintaining networking hardware components and systems.
**Prerequisite:** TECH 26301.
**Schedule Type:** Combined Lecture and Lab
**Contact Hours:** 2 lecture, 2 lab
**Grade Mode:** Standard Letter
TECH 36337  INFORMATION TECHNOLOGY SECURITY  3 Credit Hours
This course provides the foundation for understanding the key issues associated with protecting information assets. It covers the essential principles for information security and risk management; making it an important stepping stone of an IT security career. The course is supported with case based industry problems and their solutions through simulation based labs. Additionally, this course prepares students for CompTIA’s Security+ SY0-501 certification exam.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 36620  PROJECT MANAGEMENT IN ENGINEERING AND TECHNOLOGY  3 Credit Hours
The planning, organizing, directing, and controlling of company technology resources for project-based management functions. Includes project coordination requirements, management and planning methods and the use of various management and planning tools.
Prerequisite: Junior or senior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 37666  KINEMATICS AND DYNAMICS OF MACHINERY  3 Credit Hours
The study of the kinematics and dynamics of machinery with an emphasis on links, cams and gears.
Prerequisite: MATH 32051.
Corequisite: MATH 32052.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 41055  INDUSTRIAL PRACTICE  1-8 Credit Hours
(Repeatable for credit) Practical experience in industry of cooperative work-study nature.
Prerequisite: Junior standing.
Schedule Type: Practicum or Internship
Contact Hours: 1-8 other
Grade Mode: Standard Letter

TECH 41065  SOLID MODELING AND SOLIDIFICATION  3 Credit Hours
Introduction to casting simulation software with emphasis on projects related to design and filling of casting molds.
Prerequisite: TECH 31065 and TECH 34002.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 41093  VARIABLE TITLE WORKSHOP IN TECHNOLOGY  1-3 Credit Hours
(Repeatable for credit)(Slashed with TECH 51093) Specialized instructional unit oriented toward the application of current technology concepts.
Prerequisite: None.
Schedule Type: Workshop
Contact Hours: 1-3 other
Grade Mode: Satisfactory/Unsatisfactory-IP

TECH 41096  INDIVIDUAL INVESTIGATION IN TECHNOLOGY EDUCATION  1-4 Credit Hours
(Repeatable for a maximum of 4 credit hours) Individual investigation course.
Prerequisite: Special approval.
Schedule Type: Individual Investigation
Contact Hours: 1-4 other
Grade Mode: Standard Letter-IP

TECH 41196  INDIVIDUAL INVESTIGATION IN TECHNOLOGY EDUCATION  1-4 Credit Hours
(Repeatable for a maximum of 4 credit hours) Individual investigation course.
Prerequisite: Special approval.
Schedule Type: Individual Investigation
Contact Hours: 1-4 other
Grade Mode: Standard Letter-IP

TECH 42100  TRAINING TOPICS IN TECHNOLOGY  1-4 Credit Hours
(Repeatable for credit) Specialized advanced instruction oriented primarily to the theoretical base and application of current technology developed by experts in the specific technology. This course requires substantial base knowledge.
Prerequisite: Special approval.
Schedule Type: Lecture
Contact Hours: 1-4 lecture
Grade Mode: Standard Letter

TECH 42103  CONSTRUCTION SPECIFICATIONS AND SERVICES  3 Credit Hours
Educates the student in the fundamental tenants that all the stakeholders in the design and construction industry hold to. With a firm understanding of what the roles and responsibilities that each stakeholder has to the others the student participates in the process of construction confident that they understand what they are expected to do in their role as well as what they can expect of the architect, the owner and the various trades.
Prerequisite: CMGT 22200.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 42200  RADIATION PROCESSING OF MATERIALS  3 Credit Hours
Description of the radiation sources used in radiation technology and the study of the effects of electrons and gamma rays on materials of technological interest. Experiments deal with the effects of radiation in different materials.
Prerequisite: PHY 13002 or PHY 12202; and MATH 12002 or MATH 19002; TECH 33363.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

TECH 42400  RADIATION DOSIMETRY AND SAFETY  3 Credit Hours
(Slashed with TECH 52400) Basic concepts of dosimetry and its units as applied to radiation technology, including theory of dosimeter response and use of dosimeters in radiation environments. Safety principles and practices followed in radiation environments, including terminology, maximum exposure limits, and procedures to minimize exposure to radiation.
Prerequisite: TECH 42200.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
TECH 43016 ADVANCED PC-NETWORK ENGINEERING AND TROUBLESHOOTING 3 Credit Hours
An in-depth look at the architecture, operation, configuration, fault analysis, troubleshooting and repair of personal computer and computer network hardware components. Topics include the operation, assembly, configuration, diagnosis, and unit-level troubleshooting of personal computer hardware, computer networking hardware, and related hardware components.
Prerequisite: TECH 33020 and TECH 36302.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 43026 MICROPROCESSOR SYSTEMS 4 Credit Hours
(Slashed with TECH 53026) Introduction to the architecture, operation and applications of an advanced microprocessor, focusing on assembly language programming and interfacing of standard programmable peripherals.
Prerequisite: TECH 33222 and TECH 46330.
Schedule Type: Laboratory, Lecture
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

TECH 43030 MECHATRONICS 3 Credit Hours
Application of automation concepts in motion control, electrical circuits, fundamental mechanics, control systems and programming including modeling, interfacing and signal conditioning.
Prerequisite: PHY 23102 and TECH 33032 and TECH 33040.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 1 lab
Grade Mode: Standard Letter

TECH 43031 MECHATRONICS II 3 Credit Hours
Advanced modeling, system response, closed loop control and system software for mechatronic systems.
Prerequisite: TECH 43030.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 1 lab
Grade Mode: Standard Letter

TECH 43050 INVENTIVE PROBLEM SOLVING 3 Credit Hours
Theory of Inventive Problem Solving, TRIZ, is a collection of powerful problem-solving tools for a broad range of inventive problems. Capstone web-based course for students finishing their bachelor’s degree. Assists students in utilizing material learned in earlier courses to solve many real world problems in multiple disciplines.
Prerequisite: Junior or senior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 43060 MANAGEMENT OF TECHNOLOGY INNOVATION 3 Credit Hours
Subjects covered in this course are case studies of innovative companies, elements of an innovation process, review of major problem solving methods, technical opportunity analysis, technical planning, technological forecasting, concept development and elements of patents. A project is included that utilizes TRIZ software and innovation model elements.
Prerequisite: Junior or senior standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 43080 INDUSTRIAL AND ENVIRONMENTAL SAFETY 3 Credit Hours
Examines the occupational safety and health act and fundamentals of industrial safety programs.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 43096 INDIVIDUAL INVESTIGATION IN APPLIED SCIENCE AND TECHNOLOGY 1-3 Credit Hours
(Repeatable for credit) Work study of an individual nature on a topic in a field of applied science and technology.
Prerequisite: Junior standing; and special approval.
Schedule Type: Individual Investigation
Contact Hours: 1-3 other
Grade Mode: Standard Letter-IP

TECH 43220 ELECTRICAL MACHINERY 3 Credit Hours
Principles of operation and application of motors, generators, transformers and other magnetic devices; electrical power generation, distribution and use.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 43221 DIGITAL CONTROL SYSTEMS AND INSTRUMENTATION 4 Credit Hours
(Slashed with TECH 53221) Focuses on applications of instrumentation and control systems using computers and microcontrollers including sensors, transducers, instruments, data acquisition boards, software programs, signal conditioning and transmission methods.
Prerequisite: MATH 12003 and PHY 23102 and TECH 43026.
Corequisite: TECH 33223.
Schedule Type: Laboratory, Lecture
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

TECH 43222 COMPUTER HARDWARE ENGINEERING AND ARCHITECTURE 3 Credit Hours
(Slashed with TECH 53222) Internal architecture and operation of digital computers. Topics include computer processor datapaths and control, computer memory datapaths and control, pipelining and parallel processing, memory architecture and management, I/O control, system bus architecture and properties, storage systems, and computer control timing and synchronization. Students gain understanding in how system software manages system resources and abstracts programming requirements. Alternative architectures such as embedded systems and SoC platforms are discussed. Industry standards for calculating system performance are used.
Prerequisite: DSCI 26010 or TECH 33222.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
**TECH 43320**  APPLIED EMBEDDED SYSTEMS II  3 Credit Hours
This course serves as an extension of TECH 33333. The student will develop advanced engineering problem solving techniques using embedded system microcontrollers. Further programming in Embedded C is supported by this practical problem solving approach. Assembler language is discussed to solve specific hardware issues. A broad survey of special use computing hardware such as FPGAs, ASICs and SoC platforms is covered with basic approaches to leverage and program these devices.
Prerequisite: TECH 33333 and TECH 36200.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 other
Grade Mode: Standard Letter

**TECH 43550**  COMPUTER-AIDED MANUFACTURING  3 Credit Hours
(Slashed with TECH 53550) The application of computers to the preparation of machine tool control programs.
Prerequisite: TECH 10001 or TECH 26010; and TECH 20002.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

**TECH 43580**  COMPUTER-AIDED MACHINE DESIGN  3 Credit Hours
Description and Prerequisite Data Currently in Banner, Application of the principles of mechanics and strength of materials, with computer assistance to the design and selection of machine components under both static and dynamic loads.
Prerequisite: TECH 10001 or TECH 26010; and TECH 33111 and TECH 34002 and MATH 12002 and PHY 13001.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

**TECH 43700**  COMPUTER-INTEGRATED MANUFACTURING  3 Credit Hours
(Slashed with TECH 53700) Study of the computer-integrated manufacturing system as it relates to product design, estimating inventory, machining and assembly, quality control and distribution.
Prerequisite: TECH 43550.
Schedule Type: Combined Lecture and Lab
Contact Hours: 5 other
Grade Mode: Standard Letter

**TECH 43800**  APPLIED ENGINEERING TECHNOLOGY SEMINAR (ELR)  3 Credit Hours
As the capstone course in Applied Engineering and Mechanical Engineering Technology, students will develop and participate in all aspects of a project involving the solution of a problem through application of technology. Students must pass the ATMAE Certified Technology Manager (CTM) exam.
Prerequisite: Applied engineering major or mechanical engineering technology major; and senior standing.
Schedule Type: Individual Investigation, Lecture
Contact Hours: 1 lecture, 2 other
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

**TECH 44000**  ANDROID DEVELOPMENT TOOLS FOR INSTRUMENT CONTROL  3 Credit Hours
The Android Development Tools for Instrument Control course examines the principles of application design and development for instrument control. More specifically, this course’s focus on device control using various android tools, for example, robots. Students will learn how to control and manage hardware using android tools. Topics will include android architecture, security, different types of hardware devices and their architecture.
Prerequisite: TECH 26200 or TECH 46330; and senior standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

**TECH 45099**  CAPSTONE: FOUNDRY TOOLING AND PATTERN MAKING (ELR)  3 Credit Hours
Capstone course for Applied Engineering Foundry Technology concentration. A project based lecture-lab focused on production of foundry tooling, testing, and quality approval.
Prerequisite: TECH 41065 and TECH 43550.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

**TECH 46000**  COMPUTER ENGINEERING TECHNOLOGY CAPSTONE (ELR)  3 Credit Hours
The course provides students with an integrative experience, applying aspects of the student’s required coursework in computer engineering technology. Students gain experience in developing requirements in engineering specifications for a practical problem in networking and telecom-related projects. This course will address emerging issues, capabilities and challenges in the current field of study.
Prerequisite: Senior standing.
Corequisite: TECH 46350.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
Attributes: Experiential Learning Requirement

**TECH 46300**  NETWORK SECURITY  3 Credit Hours
Introduction to Network security with emphasis in identifying, analyzing and preventing various threats and attack patterns on computer networks. Students will gain practical knowledge on network security protocols, firewalls, VPN, Intrusion detection and prevention systems. Prepares students for industry certification.
Prerequisite: TECH 26301.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter
TECH 46312 WIRELESS NETWORK AND TELECOMMUNICATION SYSTEMS  3 Credit Hours
(Slashed with TECH 56312) Course builds upon existing wired networking skills and extends the students' knowledge into the world of wireless networking. Students learn digital wireless fundamentals, wireless standards, how to implement a wireless network in an enterprise environment and how to trouble shoot wireless issues. Curriculum follows and prepares students for industry certification in wireless networking.
Prerequisite: TECH 26301.
Corequisite: TECH 36302.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 46316 SERVER ADMINISTRATION AND CONFIGURATION I  3 Credit Hours
This course emphasizes on configuring and administering server operating systems to solve engineering problems. Students are expected to learn MS server management, Active Directory, OUs and server roles by utilizing variety of on-based and cloud based solutions.
Prerequisite: None.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 46330 VISUAL BASIC PROGRAMMING IN ENGINEERING TECHNOLOGY  3 Credit Hours
(Slashed with TECH 56330) Course includes programming in a high-level object-oriented, event-driven visual programming language, Visual Basic 2010 Express, conditional statements, iterative statements, arrays, object oriented programming, classes, objects, methods, inheritance, exception handling, graphical user interfaces with Windows Forms.
Prerequisite: DSCI 26010 or TECH 26010.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 4 other
Grade Mode: Standard Letter

TECH 46350 NETWORK MANAGEMENT AND DESIGN TECHNOLOGY  3 Credit Hours
(Slashed with TECH 56350) Course covers the technical aspects of centrally managed and distributed Wide Area Networks, with an emphasis on the techniques used to maintain and improve the performance of telecommunications and data networks. Students will use software packages to monitor the real-time performance of a network and to diagnose various networking hardware and software problems. Topics include the five stacks of network management (fault management, configuration management, performance management, security management, and accounting management). Examples of current specific network management products are reviewed.
Prerequisite: TECH 36302.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 46411 REQUIREMENTS ENGINEERING AND ANALYSIS  3 Credit Hours
(Slashed with TECH 56411) Techniques to conceptualize, develop and analyze requirements engineering specifications for practical systems. Topics covered include identifying stakeholders and how to effectively work with them, requirements elicitation techniques; requirements engineering in the problem and solution domains. The students are provided with an opportunity to participate in formal review of their projects by industry experts. Strong analytic skills, algorithms or programming experience is recommended.
Prerequisite: DSCI 26010 or TECH 26010 with a minimum C grade.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 46510 APPLIED INFORMATION TECHNOLOGY SECURITY  3 Credit Hours
The purpose of the course is to provide the student with an overview of the field of information security and assurance. Students will be exposed to the spectrum of security activities, methods, methodologies, and procedures. Coverage will include inspection and protection of information assets, detection of and reaction to threats to information assets, and examination of pre and post incident procedures and an overview of the information technology security.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 47210 SUSTAINABLE ENERGY I  3 Credit Hours
(Slashed with TECH 57210) A comprehensive overview of energy sources and energy systems, with an emphasis on renewable energy and the implementation and sustainability of various forms of energy. Examines the characteristics of conventional non-renewable energy systems, along with alternate, renewable energy sources and systems. Includes fundamental energy concepts and the conversion, delivery, distribution, and storage of energy. Explores the technological application of various sources of energy and compares their benefits and limitations. Also presents an overview of present U.S. and global energy needs and demands, and the sustainable energy technologies that may be used to meet future energy demands.
Prerequisite: None.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
TECH 47211  SUSTAINABLE ENERGY II  3 Credit Hours
(Slashed with TECH 57211) An in-depth study of the analysis, selection and implementation of various energy and power sources, with an emphasis on the use of renewable, sustainable energy systems. Focuses on determining energy needs, and on assessing and comparing energy systems with respect to efficiency, technical feasibility, available resources, cost and sustainability characteristics. Includes economics of energy systems, methods for determining costs, and cost-benefit analysis of various energy and power systems. Also includes the social, economic and environmental impact associated with the development, implementation and use of various forms of energy.
Prerequisite: TECH 47210.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 50092  INDUSTRIAL PRACTICE  1-4 Credit Hours
Practical experience in industry of a cooperative work-study nature.
Prerequisite: Graduate standing; and special approval.
Schedule Type: Practicum or Internship
Contact Hours: 3-12 other
Grade Mode: Standard Letter

TECH 51001  METHODS IN TECHNOLOGY EDUCATION  3 Credit Hours
Methods of teaching curriculum development and evaluation which are unique to the profession of technology education.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 51002  ORGANIZATION IN TECHNOLOGY EDUCATION  3 Credit Hours
Principles and practices involved in curriculum and facility design appropriate for technology education including equipment maintenance.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 51051  FOUNDATIONS AND CONTEMPORARY THEORIES OF TECHNOLOGY EDUCATION  3 Credit Hours
This course explores the history, contemporary theories and practices of technology education. Included are site visits to exemplary technology education programs.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 51052  TECHNOLOGY AND ENGINEERING FOR K TO 8 STEM  3 Credit Hours
Using discussion, laboratory experience and field experiences this course explores technology education as it relates to all content areas of the K-12 curriculum.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

TECH 51093  VARIABLE TITLE WORKSHOP IN TECHNOLOGY  1-3 Credit Hours
(Repeatable for credit) (Slashed with TECH 41093) Specialized instructional unit oriented toward the application of current technology concepts.
Prerequisite: Graduate standing.
Schedule Type: Workshop
Contact Hours: 1-3 other
Grade Mode: Satisfactory/Unsatisfactory

TECH 52200  INTERACTION OF RADIATION WITH MATERIALS  3 Credit Hours
Understand the basic mechanisms of the interaction of alpha, beta, and gamma radiation with matter. Understand how radiation is absorbed in matter. Learn the effects of radiation in different materials of consumers' importance like, biological materials, medical devices, polymers, inks and coatings.
Prerequisite: TECH 52400; and graduate standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 52400  RADIATION DOSIMETRY AND SAFETY  3 Credit Hours
(Slashed with TECH 42400) Basic concepts of dosimetry and its units as applied to radiation technology, including theory of dosimeter response and use of dosimeters in radiation environments. Safety principles and practices followed in radiation environments, including terminology, maximum exposure limits, and procedures to minimize exposure to radiation.
Prerequisite: PHY 12202 or PHY 13002; and MATH 12002 or MATH 19002; and graduate standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 53026  INTRODUCTION TO MICROPROCESSORS  4 Credit Hours
(Slashed with TECH 43026) Introduction to the architecture, operation and applications of an advanced microprocessor, focusing on assembly language programming and interfacing of standard programmable peripherals.
Prerequisite: TECH 33222 and TECH 46330.
Schedule Type: Laboratory, Lecture
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

TECH 53221  DIGITAL CONTROL SYSTEMS AND INSTRUMENTATION  4 Credit Hours
(Slashed with TECH 43221) Focuses on applications of instrumentation and control systems using computers and microcontrollers including sensors, transducers, instruments, data acquisition boards, software programs, signal conditioning and transmission methods.
Prerequisite: TECH 33223; and TECH 43026 or TECH 53026; and graduate standing.
Schedule Type: Laboratory, Lecture
Contact Hours: 3 lecture, 2 lab
Grade Mode: Standard Letter

College of Aeronautics and Engineering
TECH 53222 COMPUTER HARDWARE ENGINEERING AND ARCHITECTURE 3 Credit Hours
(Slashed with TECH 43222) Internal architecture and operation of digital computers. Topics include computer processor datapaths and control, computer memory datapaths and control, pipelining and parallel processing, memory architecture and management, IO control, system bus architecture and properties, storage systems, and computer control timing and synchronization. Students gain understanding in how system software manages system resources and abstracts programming requirements. Alternative architectures such as embedded systems and SoC platforms are discussed. Industry standards for calculating system performance are used.
Prerequisite: Graduate standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 53550 COMPUTER-AIDED MANUFACTURING 3 Credit Hours
(Slashed with TECH 43550) The application of computers to the preparation of machine tool control programs.
Prerequisite: TECH 23581; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 4 other
Grade Mode: Standard Letter

TECH 53700 COMPUTER-INTEGRATED MANUFACTURING 3 Credit Hours
(Slashed with TECH 43700) Study of the computer-integrated manufacturing system as it relates to product design, estimating inventory, machining and assembly, quality control and distribution.
Prerequisite: TECH 31020 and TECH 53550; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 4 other
Grade Mode: Standard Letter

TECH 53800 APPLIED ENGINEERING TECHNOLOGY SEMINAR 2 Credit Hours
An individual or group project involving the solution of a problem through the application of technology.
Prerequisite: Graduate standing; and special approval.
Schedule Type: Seminar
Contact Hours: 2 other
Grade Mode: Standard Letter

TECH 56321 WEB DATABASE INTEGRATION 3 Credit Hours
Laboratory course focused on integrating data sources into web sites. Current topics include server-side processing principles, Web forms, database programming objects and structured query language.
Prerequisite: Graduate standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

TECH 56330 VISUAL BASIC PROGRAMMING IN ENGINEERING TECHNOLOGY 3 Credit Hours
(Slashed with TECH 46330) Course includes programming in a high-level object-oriented, event-driven visual programming language, Visual Basic 2010 Express, conditional statements, iterative statements, arrays, object oriented programming, classes, objects, methods, inheritance, exception handling, graphical user interfaces with Windows Forms.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 4 other
Grade Mode: Standard Letter

TECH 56350 NETWORK MANAGEMENT AND DESIGN TECHNOLOGY 3 Credit Hours
(Slashed with TECH 46350) Course covers the technical aspects of centrally managed and distributed Wide Area Networks, with an emphasis on the techniques used to maintain and improve the performance of telecommunications and data networks. Students will use software packages to monitor the real-time performance of a network and to diagnose various networking hardware and software problems. Topics include the five stacks of network management (fault management, configuration management, performance management, security management, and accounting management). Examples of current specific network management products are reviewed.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 4 other
Grade Mode: Standard Letter

TECH 56411 REQUIREMENTS ENGINEERING AND ANALYSIS TECHNOLOGY 3 Credit Hours
Techniques to conceptualize, develop and analyze requirements engineering specifications for software and telecommunications systems. Topics covered include identifying stakeholders and how to effectively work with them, requirements elicitation techniques; requirements engineering in the problem and solution domains. Strong analytic skills, algorithms or programming experience is recommended.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
TECH 57200   SYSTEMS ENGINEERING    3 Credit Hours
(Slashed with TECH 47200) Systems engineering as a method to solve problems. Introduction to the fundamental systems engineering principles, processes, and methodologies used to analyze, design, develop, and deploy complex, sustainable systems. Focuses on systems engineering as a logical, disciplined, systematic, and coherent approach to the design and the development of a system, across the full life cycle of the system. Special emphasis is made on the concepts, methods and activities used to analyze systems, to define and allocate requirements, to transform requirements into a system design, and to verify and validate the system.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

TECH 57210   SUSTAINABLE ENERGY I    3 Credit Hours
(Slashed with TECH 47210) A comprehensive overview of energy sources and energy systems, with an emphasis on renewable energy and the implementation and sustainability of various forms of energy. Examines the characteristics of conventional non-renewable energy systems, along with alternate, renewable energy sources and systems. Includes fundamental energy concepts and the conversion, delivery, distribution, and storage of energy. Explores the technological application of various sources of energy and compares their benefits and limitations. Also presents an overview of presents U.S. and global energy needs and demands, and the sustainable energy technologies that may be used to meet future energy demands.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

TECH 57211   SUSTAINABLE ENERGY II    3 Credit Hours
(Slashed with TECH 47211) An in-depth study of the analysis, selection and implementation of various energy and power sources, with an emphasis on the use of renewable, sustainable energy systems. Focuses on determining energy needs, and on assessing and comparing energy systems with respect to efficiency, technical feasibility, available resources, cost and sustainability characteristics. Includes economics of energy systems, methods for determining costs, and cost-benefit analysis of various energy and power systems. Also includes the social, economic, and environmental impact associated with the development, implementation, and use of various forms of energy.
Prerequisite: TECH 57210; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

TECH 60000   PROJECT MANAGEMENT IN A TECHNOLOGICAL ENVIRONMENT    3 Credit Hours
The planning, organizing, directing and controlling of company technology resources for relatively short term objectives. Students will also learn to make application of current projects.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 60001   QUANTITATIVE METHODS IN TECHNOLOGY    3 Credit Hours
Descriptive and inferential statistics used in technology and engineering. Emphasis is on the methods of analysis and the interpretation of data associated with research and development in technological and engineering environments. Course topics include representation of data, descriptive statistics, probability and probability distributions, inferential statistics, statistical design, and the analysis of experiments. No previous familiarity with probability or statistics is assumed. The ability to utilize basic algebra is required.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 60003   SIX-SIGMA: TOOLS AND APPLICATIONS FOR TECHNOLOGY MANAGEMENT    3 Credit Hours
Principles and concepts of six-sigma to improve organizational efficiency, effectiveness and productivity by improving quality, reducing waste, defects and failures.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 60010   RADIATION SOURCES FOR RADIATION PROCESSING    3 Credit Hours
Description of the basic types of radiations used for Radiation Processing and how these radiations are produced. Describe the types of gamma, electron, and Bremsstrahlung facilities used in the area of Radiation Processing and the qualifications of an irradiator to be used in this area. The student will also learn about the different industries that use ionizing radiation in their processes.
Prerequisite: TECH 52400; and graduate standing.
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 60020   QUALITY STANDARDS    3 Credit Hours
This course introduces students to issues in quality standards, quality assurance and statistical inference in applied technology and process control. Topics include systems reliability, quality control, SPC, control charts, principles and methods of statistical analysis and prediction, and hypothesis testing.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 60078   RESEARCH METHODS IN TECHNOLOGY    3 Credit Hours
Research techniques for the technologist. Methods for designing, conducting, analyzing and interpreting results of technological research.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 61000   INDUSTRIAL TECHNOLOGY EDUCATION    3 Credit Hours
This course provides students with an understanding of the rationale and issues related to developing the industrial technology education program.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
TECH 61003  METHODS AND ORGANIZATION IN TECHNOLOGY  
EDUCATION  3 Credit Hours  
Curriculum development, organization, and evaluation for technology education's role in STEM. Includes demonstration techniques and safety instruction, lesson plan development and facility design principles.  
Prerequisite: Graduate standing.  
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter  

TECH 61095  SPECIAL TOPICS IN APPLIED ENGINEERING  1-4 Credit Hours  
(Repeatable for credit) Study of significant and current issues in various Applied Engineering topics not covered in regular courses. Offered when opportunities and resources permit; the topic is announced when the course is scheduled.  
Prerequisite: Graduate standing.  
Schedule Type: Lecture  
Contact Hours: 1-4 lecture  
Grade Mode: Standard Letter  

TECH 61098  RESEARCH  1-15 Credit Hours  
(Repeatable for credit) Research or individual investigation for master's level graduate students. Credits earned may be applied toward meeting degree requirements if department approves.  
Prerequisite: Graduate standing.  
Schedule Type: Research  
Contact Hours: 1-15 other  
Grade Mode: Standard Letter  

TECH 61199  THESIS I  2-6 Credit Hours  
Thesis option student must register for a total of 6 hours, 2 to 6 in a single semester or to be distributed over several semesters if desired.  
Prerequisite: Advisor's special approval; and graduate standing.  
Schedule Type: Masters Thesis  
Contact Hours: 2-6 other  
Grade Mode: Satisfactory/Unsatisfactory-IP  

TECH 61299  THESIS II  2 Credit Hours  
Thesis students must continue registration each semester until all degree requirements are met.  
Prerequisite: TECH 61199; and graduate standing.  
Schedule Type: Masters Thesis  
Contact Hours: 2 other  
Grade Mode: Satisfactory/Unsatisfactory-IP  

TECH 62396  INDIVIDUAL INVESTIGATION IN ELECTRONIC TECHNOLOGY  2 Credit Hours  
(Repeatable for credit) Individual investigation of a student-selected topic oriented toward the technical aspects of electronics.  
Prerequisite: TECH 53221; and graduate standing.  
Schedule Type: Individual Investigation  
Contact Hours: 3 other  
Grade Mode: Standard Letter-IP  

TECH 63010  COMPUTER HARDWARE  3 Credit Hours  
Introduction to the hardware, architecture and operation of the personal computer and associated devices. Topics include personal computer architecture and operation fundamentals, basic hardware, data busses and ports, hardware component packaging, auxiliary hardware components, and computer assembly, basic hardware installation, configuration and troubleshooting.  
Prerequisite: Graduate standing.  
Schedule Type: Combined Lecture and Lab  
Contact Hours: 2 lecture, 2 lab  
Grade Mode: Standard Letter  

TECH 63020  FIBER OPTIC SYSTEMS  3 Credit Hours  
Principles and characteristics of fiber optics, fiber optic system components and applications of fiber optics in electronic communication systems.  
Prerequisite: TECH 33220; and graduate standing.  
Schedule Type: Lecture  
Contact Hours: 3 lecture  
Grade Mode: Standard Letter  

TECH 63031  PROGRAMMABLE LOGIC CONTROLLERS  3 Credit Hours  
Programmable logic controllers (PLCs) covering hardware, ladder logic programming, networking and communications. Programming timers, counters and sequencers and an introduction to human machine interfaces (HMIS). An understanding of basic electricity and computer technology is required.  
Prerequisite: Graduate standing.  
Schedule Type: Combined Lecture and Lab  
Contact Hours: 2 lecture, 1 lab  
Grade Mode: Standard Letter  

TECH 63032  ADVANCED PROGRAMMABLE LOGIC CONTROLLERS  3 Credit Hours  
Advanced principles and applications of programmable logic controllers with a focus on using sequential function charts to control complex industrial processes. Includes real time control issues, PLC networking, programming languages other than ladder logic, standards, motion control, supervisory control and data acquisition, process control, alarm management, power failure strategies and safety.  
Prerequisite: TECH 33031 or TECH 63031; and graduate standing.  
Schedule Type: Combined Lecture and Lab  
Contact Hours: 2 lecture, 2 lab  
Grade Mode: Standard Letter  

TECH 63040  ELECTRONIC COMMUNICATIONS  3 Credit Hours  
Study of electronic communications systems fundamentals, characteristics, design considerations and implementation. Topics include signal modulation and demodulation, multiplexing, noise, transmitters, receivers, signal propagation, digital communications, transmission lines, antennas and practical applications.  
Prerequisite: Graduate standing.  
Schedule Type: Laboratory, Lecture, Combined Lecture and Lab  
Contact Hours: 2 lecture, 2 lab  
Grade Mode: Standard Letter
**TECH 63041 MOTORS AND CONTROLLERS** 3 Credit Hours
TheorY and application of AC and DC motors, motor control, and machine operations in mechatronic systems. Includes introduction to basic control system terms and devices, input and output transducers, signal conditioning, open loop and closed loop control, stability and performance.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

**TECH 63045 MECHATRONICS** 3 Credit Hours
Application of automation concepts in motion control, electrical circuits, fundamental mechanics, control systems and programming including modeling, interfacing and signal conditioning.
Prerequisite: TECH 33032 or TECH 63040; and TECH 63040; and PHY 23102; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

**TECH 63046 ADVANCED MECHATRONICS** 3 Credit Hours
Advanced modeling, system response, closed loop control and system software for mechatronic systems.
Prerequisite: TECH 43030 or TECH 63045; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

**TECH 63050 TRIZ: THEORY OF INVENTIVE PROBLEM-SOLVING** 3 Credit Hours
TRIZ is a collection of powerful problem-solving tools for a broad range of inventive problems. The theory originated in Russia by the study of more than two million patents. Students utilize material learned in earlier courses to solve real world problems in multiple disciplines.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

**TECH 63060 MANAGEMENT OF TECHNOLOGY INNOVATION** 3 Credit Hours
Subjects covered in this course include: case studies of innovative companies, elements of an innovation process, review of major problem solving methods, technical opportunity analysis, technical planning, technological forecasting, concept development and elements of patents. A project is included that utilizes TRIZ software and innovation model elements.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

**TECH 63070 COMPUTER HARDWARE DESIGN AND INTEGRATION** 3 Credit Hours
In-depth study of personal computer (PC) and computer networking hardware. Topics include PC design, basic and auxiliary PC hardware components, PC assembly, PC upgrade and optimization, and PC repair, diagnosis and troubleshooting. Additional topics include computer networking hardware, network architecture, network communication protocols, and network installation, configuration and maintenance. Includes laboratory.
Prerequisite: EERT 22014 or TECH 33010; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

**TECH 63100 COMPUTER-AIDED DESIGN** 3 Credit Hours
Study of modern industrial practice using computers in advanced graphics, design and analysis including geometric dimensioning and tolerancing, parametric design, solid modeling and finite element analysis. Two hours lecture and two hours lab.
Prerequisite: TECH 23581; and graduate standing.
Schedule Type: Laboratory, Lecture
Contact Hours: 1 lecture, 3 lab
Grade Mode: Standard Letter

**TECH 63496 INDIVIDUAL INVESTIGATION IN ENERGY/POWER TECHNOLOGY** 1-4 Credit Hours
(Repeatable for credit) Individual investigation of selected topics associated with energy and power technology.
Prerequisite: Graduate standing; and special approval.
Schedule Type: Individual Investigation
Contact Hours: 3-12 other
Grade Mode: Standard Letter-IP

**TECH 63870 FACILITY DESIGN AND MATERIAL HANDLING** 3 Credit Hours
Intended to provide students with a fundamental understanding of how layout affects the flow through a system. Both qualitative and quantitative tools are presented for a complete approach to facility design and material handling.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

**TECH 64010 CONNECTIVITY AND INTEROPERABILITY IN INDUSTRY** 3 Credit Hours
This course focuses on integrating and administering multiple systems in an industrial environment.
Prerequisite: IT 46311; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

**TECH 64012 INFORMATION TECHNOLOGY AND AUTOMATION IN INDUSTRY** 3 Credit Hours
This course will focus on developing systems that analyze and automate industrial processes and provide decision support. Two and one half hours lecture and one half hour lab.
Prerequisite: Graduate standing; and special approval.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter
TECH 64095  SPECIAL TOPICS IN COMPUTER ENGINEERING TECHNOLOGY  1-4 Credit Hours
(Repeatable for credit) Study of significant and current issues in computer and network engineering technologies not covered in regular courses. Offered when opportunities and resources permit; the topic is announced when the course is scheduled.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 1-4 lecture
Grade Mode: Standard Letter

TECH 64312  ADVANCED WIRELESS TELECOMMUNICATION SYSTEM AND NETWORK TECHNOLOGIES  3 Credit Hours
Describes technologies associated with wireless and telecommunications systems. Topics covered include Public Switch Telephone Network infrastructures, Intelligent Networks, Wireless Technologies in Manufacturing Enterprises, 3GPP Standards, ITU Standards.
Prerequisite: TECH 56350; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 64396  INDIVIDUAL INVESTIGATION IN COMMUNICATION TECHNOLOGY  2 Credit Hours
(Repeatable for credit) Independent research consisting of a problem statement followed by literature search and application of an industrial practice. A proposal must be developed and a written paper project presented to faculty and industrial representatives.
Prerequisite: Graduate standing; and special approval.
Schedule Type: Individual Investigation
Contact Hours: 2 other
Grade Mode: Standard Letter-IP

TECH 65330  ADVANCED VISUAL BASIC PROGRAMMING IN ENGINEERING TECHNOLOGY  3 Credit Hours
Advanced concepts in Visual Basic Programming for solving engineering problems. Topics covered include classes and objects; SQL server databases, Language Integrated Query, creating web apps, programming web forms, and security. Familiarity with Visual Basic Programming in Engineering Technology (TECH 56330) is strongly recommended.
Prerequisite: TECH 56330; and graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 2 lecture, 2 lab
Grade Mode: Standard Letter

TECH 65500  QUALITY SYSTEMS AND INDUSTRIAL PRODUCTIVITY  3 Credit Hours
Tools and techniques for increasing industrial productivity through total quality management. Productivity improvement techniques involving human, technology, material, product and processes, utilizing value engineering, analytical models and scientific management tools in high-technology environment.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 65550  DESIGN AND ANALYSIS OF EXPERIMENTS IN TECHNOLOGY  3 Credit Hours
Introduces planning and conducting experiments, as well as analyzing the resulting data using statistical techniques to obtain valid and objective conclusions. Also focuses on experiments performed in areas such as product design, manufacturing process development and process improvement.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 65551  INTRODUCTION TO NANOTECHNOLOGY  3 Credit Hours
Provides an in-depth overview of the fundamentals of nanoscience and nanotechnology. Includes a survey of developments within the breadth of the nanotechnology in various fields such as electronics, materials, energy, and biomedical science, etc.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 65700  APPLIED RELIABILITY ENGINEERING  3 Credit Hours
Introduction to Reliability Engineering for Engineering-Technology Management Professionals. Course includes design for reliability, failure mode and failure effect analysis, reliability testing and measurement, statistical and mathematical modeling, assessment and forecasting.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 65800  BURN-IN/STRESS-TESTING FOR RELIABILITY  3 Credit Hours
Comprehensive course on reliability testing to analyze and establish reliability standards for components, products and systems. Specific emphasis on burn-in and stress testing procedures to perform effective reliability statistical calculations will be the major focus of the course.
Prerequisite: Graduate standing.
Schedule Type: Combined Lecture and Lab
Contact Hours: 3 other
Grade Mode: Standard Letter

TECH 66350  ADVANCED NETWORK MANAGEMENT AND DESIGN TECHNOLOGY  3 Credit Hours
Covers network management techniques including the TMN framework and the ISO Model for managing WAN communication networks. Topics covered include network management technologies, TMN protocols, Common Management Information Protocol, ISO Model, Management Information Base (MIB) architecture, Network Operations Center and Network Design. Examples of current network management tools are reviewed. Upon completion of this course, students will have a good understanding of network management framework and network management technologies for communication networks.
Prerequisite: TECH 56350; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter
TECH 66380  ADVANCED NETWORKING  3 Credit Hours
Provides student with experience in advanced computer networking techniques including network architectures, network security, network virtualization and storage area networks.
Prerequisite: TECH 56350; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 66382  NETWORK SECURITY  3 Credit Hours
Provides student with experience in fundamental and advanced computer networking techniques including network architectures, LAN systems, network security, and network management and administration.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 66411  WIRELESS AND TELECOMMUNICATION SYSTEMS REQUIREMENTS ENGINEERING  3 Credit Hours
Methods and techniques to develop requirements engineering specifications for wireless and telecommunication systems. Topics covered include Industry standards for telecom and wireless communications, reference data models, functional requirements specifications, performance analysis, the requirements review process, and systems verification. Familiarity with Requirements Engineering and Analysis (TECH 56411) concepts is recommended.
Prerequisite: TECH 56411; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 66596  INDIVIDUAL INVESTIGATION IN MATERIALS TECHNOLOGY  2 Credit Hours
(Repeatable for credit) Research directed toward the study and application of metallic and nonmetallic materials.
Prerequisite: TECH 20002 or TECH 33363; and graduate standing.
Schedule Type: Individual Investigation
Contact Hours: 2 other
Grade Mode: Standard Letter-IP

TECH 66796  INDIVIDUAL INVESTIGATION IN INDUSTRIAL PROCESSES  2 Credit Hours
(Repeatable for credit) Individual investigation of a student-selected topic oriented towards industrial/manufacturing processes.
Prerequisite: TECH 20002; and graduate standing.
Schedule Type: Individual Investigation
Contact Hours: 3 other
Grade Mode: Standard Letter-IP

TECH 67000  SUSTAINABLE SYSTEMS AND TECHNOLOGY  3 Credit Hours
Introduction to the fundamental concepts and principles of sustainability, sustainable technologies and sustainable systems. Provides students with an understanding of the basic principles and key issues of environmental, social and economic sustainability. Closely examines sustainability as it applies to the relationships among human beings, technology and the environment, with a special emphasis on sustainability in the context of "meeting humanity's current needs." Also stresses the ethics and importance of sustainability and the use of sustainable systems.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 67010  ETHICS, TECHNOLOGY AND THE ENVIRONMENT  3 Credit Hours
Explores the fundamental issues of the interconnections between human beings and the environment, with an emphasis on the ethics and the importance of the sustainability. Takes an in-depth look at basic environmental concepts, ethics and values, as they relate to a wide range of practical subject matters, including technology, from global and national perspectives. Provides an in-depth look at sustainable systems and the ethical issues associated with sustainability as it relates to technology by focusing on common and future impacts as they apply to ethics, values and justice.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter

TECH 67220  LIFE CYCLE DESIGN I  3 Credit Hours
An in-depth investigation of Life Cycle Design of sustainable systems. Explores the cradle to cradle path of products with an emphasis on system Life Cycle stages and processes from a sustainability perspective. Examines how environmentally conscious system design can be accomplished by considering the environmental impact of technology and engineering as the part of the sustainable design process. Includes the study of sustainable development with respect to Green Technologies, hazardous materials and processes and reducing the environmental impact of product development and utilization. Also includes an introduction to Life Cycle Assessment and various Environmental and Life Cycle standards.
Prerequisite: Graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

TECH 67221  LIFE CYCLE DESIGN II  3 Credit Hours
An in-depth study of environmental performance, environmentally conscious design and sustainable development. Focuses on Life Cycle Analysis and Assessment as a means to determine the potential economic, environmental, and ecological impact of products, processes, and activities across their entire life cycle. Takes a close look at the beneficial and detrimental effects of various technologies, materials, products and processes with special attention to the reduction of harmful effects to human beings, the ecosystem, and the environment. Covers the analysis and assessment of energy consumption, natural resource depletion, and environmental degradation, and ways to minimize detrimental effects on the environment. Includes the use of various life cycle engineering and assessment processes, models and analytical tools to identify, evaluate, and compare the environmental consequences associated with various products/activities, across a wide range of impact categories, to assist in design and decision making.
Prerequisite: TECH 67220; and graduate standing.
Schedule Type: Lecture
Contact Hours: 3 lecture
Grade Mode: Standard Letter-IP

30  College of Aeronautics and Engineering
TECH 67596  INDIVIDUAL INVESTIGATION IN MANUFACTURING TECHNOLOGY  2 Credit Hours
(Repeatable for credit) Independent study related to manufacturing industries. The study may include the development of a product for manufacture (or service) or the in depth examination of an element of manufacturing.
Prerequisite: Graduate standing.
Schedule Type: Individual Investigation
Contact Hours: 3 other
Grade Mode: Standard Letter-IP

TECH 68196  INDIVIDUAL INVESTIGATION IN ENGINEERING GRAPHICS  2 Credit Hours
(Repeatable for credit) Investigation of selected topics within engineering graphics, including computer-aided design.
Prerequisite: Graduate standing.
Schedule Type: Individual Investigation
Contact Hours: 3 other
Grade Mode: Standard Letter-IP

TECH 68796  INDIVIDUAL INVESTIGATION IN INDUSTRIAL TECHNOLOGY SYSTEMS DESIGN  2 Credit Hours
(Repeatable for credit) The study of two-and three dimensional design as related to manufacturing construction communication and energy power including patents creativity and problem solving approaches.
Prerequisite: Graduate standing.
Schedule Type: Individual Investigation
Contact Hours: 3 other
Grade Mode: Standard Letter-IP