AVIATION EMERGING TECHNOLOGIES

Programs

bachelor

- Aviation Emerging Technologies / Bachelor of Science (https://catalog.lewisu.edu/undergraduate/aviation-science-technology/aviation-emerging-technologies/aviation-emerging-technologies-bachelor-science/)

minor

- Unmanned Aircraft Systems / Minor (https://catalog.lewisu.edu/undergraduate/aviation-science-technology/aviation-emerging-technologies/unmanned-aircraft-systems-minor/)

Courses

AVMT 10200 - Introduction to Aviation (1)
This general course is designed to acquaint student's with the many aspects of and career opportunities in the aviation industry.

AVMT 10500 - Aviation Technical Writing (3)
This class studies grammar, spelling, composition of letters of application, resumes, references and the use of a word processor. A technical project report is completed during the semester. 45 contact hours (45 lecture). Meets requirements of 14 CFR 147.

AVMT 10600 - Aviation Fundamentals (4)
Students learn about aerodynamics, aircraft design, stability, control, Federal Aviation Administration regulations and publications, weight and balance, and ground handling of aircraft. 90 contact hours (60 lecture/30 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 10601

AVMT 10601 - Aviation Fundamentals Lab (0)
Corequisite: AVMT 10600

AVMT 11000 - Aircraft Structures 1 (4)
The focus of this course is riveting and sheet metal repair, including aluminum, forming and layout and oxyacetylene welding operation. Corrosion and corrosion control are also studies. 180 contact hours (60 lecture/120 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 11001

AVMT 11001 - Aircraft Structures Lab (0)
Corequisite: AVMT 11000

AVMT 12000 - Aircraft Electricity 1 (4)
This course provides a study of DC electrical circuits, Ohm's Law, magnetism, generators, regulators, motors, aircraft electrical circuit components, wiring diagrams, batteries and electrical meters. 120 contact hours (60 lecture/60 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 12001

AVMT 12001 - Aircraft Electricity Lab (0)
Corequisite: AVMT 12000

AVMT 13000 - Airframe Inspection (3)
This combined lecture/laboratory course familiarizes the student with liquid penetrant, magnetic particle, eddy current, radiographic, sonic and ultrasonic evaluation procedures applicable to aircraft structures and engines using nondestructive testing methods. Students will learn and apply concepts to successfully conduct airframe inspections. Meets requirements of 14 CFR 147.
Corequisite: AVMT 13001
Attributes: Experiential Learning Gen Ed

AVMT 13001 - Airframe Inspection Lab (0)
Corequisite: AVMT 13000

AVMT 13500 - Drafting and Blueprint Reading (3)
Lettering and use of equipment are studied, including orthographic projections, sectioning, auxiliary views, isometric and oblique views and reading of electrical, mechanical and hydraulic drawings. 45 contact hours (45 combined lecture/lab). Meets requirements of 14 CFR 147.

AVMT 20000 - Aircraft Instruments (4)
This course provides a study of pressure, mechanical and electrical instruments; compass system;, gyro instruments and systems; radio communications and navigation equipment; and auto pilot systems. 120 contact hours (60 lecture/60 lab). Meets requirements of 14 CFR 147.
Prerequisite: AVMT 12000 (may be taken concurrently) or AVTR 12000 (may be taken concurrently)
Corequisite: AVMT 20001

AVMT 20001 - Aircraft Instruments Lab (0)
Corequisite: AVMT 20000

AVMT 20100 - Aviation Math and Physics (4)
Students study the laws of physics with aviation applications, including structure of matter, gas laws, heat transfer, and properties of liquids while implementing basic algebraic concepts into practice. Meets requirements of 14 CFR 147.
Attributes: Science General Education

AVMT 20200 - Aviation Physics 2 (3)
This course provides an advanced study of physics focusing on strength of materials, light, sound and atomic energy. 45 contact hours (45 combined lecture/lab).
Prerequisite: AVMT 20100 (may be taken concurrently)

AVMT 21000 - Aircraft Structures 2 (4)
A continuation of AVMT 11000, this course focuses on types of airframe structures, including wood and fabric applications and repairs, aircraft assembly and rigging, use and repairs of plastics and honeycomb repairs. 180 contact hours (60 lecture/120 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 21001

AVMT 21001 - Aircraft Structures 2 Lab (0)
Corequisite: AVMT 21000

AVMT 22000 - Aircraft Electricity 2 (4)
A continuation of AVMT 12000, this course focuses on AC circuits, capacitance and inductance, AC generators, transformers, resonant circuits, electron tubes and solid state components. 120 contact hours (60 lecture/60 lab). Meets requirements of 14 CFR 147.
Prerequisite: AVMT 12000 (may be taken concurrently)
Corequisite: AVMT 22001

AVMT 22001 - Aircraft Electricity 2 Lab (0)
Corequisite: AVMT 22000

AVMT 23000 - Aircraft Systems 1 (3)
Students learn about hydraulic systems, oxygen systems, fire detection, firefighting systems, pneumatic systems, and water and waste systems. Meets requirements of 14 CFR 147.3C.
Corequisite: AVMT 23001

AVMT 23001 - Aircraft Systems 1 Lab (0)
Corequisite: AVMT 23000

AVMT 25100 - Avionics 1 (2)
This course focuses on principles and approved installation procedures for aircraft radio communications, navigation equipment and related items. Lectures and lab are supplemented with slides, films, and a tour. 45 contact hours (45 combined lecture/lab).
Prerequisite: AVMT 12000 (may be taken concurrently)
Program Restrictions: Must be enrolled in the following Program: Unmanned Aircraft Systems .

AVMT 25101 - Avionics 1 Lab (0)

AVMT 31000 - Aircraft Reciprocating Engines (4)
This course in the construction and operation of all types of reciprocating engines includes study of engine nomenclature, operating principles, horsepower, calculations, engine efficiencies and cylinder arrangement, as well as methods of disassembly, cleaning, inspection, magnaflux, repairs and assembly and regulations pertaining to repair and overhaul procedures. 105 contact hours (45 lecture/60 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 31001

AVMT 31001 - Aircraft Reciprocating Engines Lab (0)
Corequisite: AVMT 31000

AVMT 32000 - Aircraft Systems 2 (3)
Students learn about aircraft jacking, aircraft fuel systems; landing gear systems; wheels, tires, and brakes; air conditioning; heating; anti- and de-icing systems; and cabin pressurization systems. Meets requirements of 14 CFR 147.3C.
Prerequisite: AVMT 23000
Corequisite: AVMT 32001

AVMT 32001 - Aircraft Systems Lab (0)
Corequisite: AVMT 32000

AVMT 33000 - Aircraft Engine Accessories (4)
Aircraft fuel systems, float type carburetors, pressure injection carburetors, direct injection systems, water injection, jet engine fuel controls, types of ignition systems, magneto theory, magneto timing, spark plugs and use of the engine analyzer are covered. 180 contact hours (90 lecture/90 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 32001

AVMT 33001 - Aircraft Engine Accessories Lab (0)
Corequisite: AVMT 33000

AVMT 34000 - Composite Material Fabrication and Repair (3)
A study of the various types of composites used on aircraft, part of this course includes vacuum bag manufacturing and repair of a honeycomb panel by each student in the laboratory. 45 contact hours (45 combined lecture/lab).
Corequisite: AVMT 34001

AVMT 34001 - Composite Material Fabrication and Repair Lab (0)
Corequisite: AVMT 34000

AVMT 34500 - Trends in Aviation and Aerospace Technology (3)
This class covers the trends that are relevant to technological advancements within the aviation and aerospace industry. Career opportunities, commercial trends, and the use of new technologies to enhance aviation and aerospace performance are discussed.
Prerequisite: UNIV 20400 (may be taken concurrently) and UNIV 20600 (may be taken concurrently)

AVMT 35100 - Avionics 2 (2)
A sequel to Avionics 1, this course continues the study of the principles and approved installation procedures for aircraft radio communication, navigation equipment and related topics. Subjects covered include advanced navigation aids, such as RNAV, LORAN, GPS, RADAR, and auto pilots. 30 contact hours (30 combined lecture/lab).
Prerequisite: AVMT 12000 (may be taken concurrently) and AVMT 20000 (may be taken concurrently) and AVMT 25100 (may be taken concurrently)

AVMT 35101 - Avionics 2 Lab (0)

AVMT 41000 - Gas Turbine Powerplants (4)
This course provides a study of the history of jet engines, turbojet and turboprop engine components and systems, gas turbine troubleshooting and trimming. 150 contact hours (60 lecture/90 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 41001

AVMT 41001 - Gas Turbine Powerplants Lab (0)

AVMT 42000 - Aircraft Propellers (4)
The theory and operation of propellers and governors, as well as overhaul and servicing of fixed-pitch, ground-adjustable, controllable and turboprop propellers are studied. 120 contact hours (60 lecture/60 lab). Meets requirements of 14 CFR 147.
Corequisite: AVMT 42001

AVMT 42001 - Aircraft Propellers Lab (0)

AVMT 42500 - Aviation and Aerospace Propulsion Systems (3)
To propel aircraft through the stratosphere with greater efficiency, faster speeds, and less carbon emissions, new propulsion systems have been engineered. This class covers commercial aircraft Turbofan Engines, Scramjet, Space Rocketry and Thruster propulsion systems.
Prerequisite: AVMT 31000 (may be taken concurrently) and AVMT 41000 (may be taken concurrently)

AVMT 42700 - Advanced Aviation and Aerospace Structures (3)
This class covers advanced aluminum sheet metal repairs and advanced composite concepts and projects. The cutting edge of aircraft structural technology is addressed including commercial applications
Prerequisite: AVMT 11000 (may be taken concurrently) and AVMT 21000 (may be taken concurrently)

AVMT 43000 - Aircraft Inspection and Engine Testing (4)
This course reviews types of inspections, use of inspection forms, log book entries, use of FAA publications, shop management responsibilities, engine operating procedures, troubleshooting, symptoms and diagnoses and engine instrumentation. 180 contact hours (60 lecture/120 lab). Meets requirements of 14 CFR 147.
Prerequisite: AVMT 31000 (may be taken concurrently) and AVMT 33000 (may be taken concurrently)
Corequisite: AVMT 43001
Attributes: Experiential Learning Gen Ed

AVMT 43001 - Aircraft Inspection and Engine Testing Lab (0)

AVMT 43500 - Aviation and Aerospace Accessory Systems (3)
Aircraft require advanced sub-systems to operate at high operational levels. Life support systems, pneumatics, bleed-air, pressurization, fly-by-wire or optic, and hydraulic systems are covered. With advancements in satellite navigation, advanced computer guidance and advanced multifunction display systems are also addressed in detail.
Prerequisite: AVMT 33000 (may be taken concurrently)

AVMT 46000 - Aviation Shop Management (3)
Students will apply fundamental skillsets required to an active aircraft maintenance shop. Students will improve areas found to be deficient and will learn to streamline maintenance hangar operations.

AVMT 46100 - Aviation Maintenance Management (3)
This course will familiarize the student with the functions and responsibilities of an aviation maintenance manager. Maintenance management at fixed based operator, commuter/regional airline, and major air carrier levels will be studied. Aviation maintenance management problem areas will be reviewed using case study methodologies.

AVMT 47000 - Helicopter Maintenance and Theory (4)
Students learn about the design, operation, and maintenance of small- to medium-size helicopters. Part of the time is spent on the actual overhaul of light helicopters. 60 contact hours (60 combined lecture/lab).

AVMT 49500 - Aviation and Aerospace Technology Capstone Experience (3)
Students will demonstrate mastery of the entire Aviation and Aerospace Technology program. Students will be asked to repair anomalies, build models, test systems, and demonstrate an in-depth knowledge of advanced aviation and aerospace technology. A written report and project portfolio will be required. The paper and projects will be collaborative and will include input on pertinent topics from the instructor.
Prerequisite: AVMT 34500 (may be taken concurrently) and AVMT 42500 (may be taken concurrently) and AVMT 42700 (may be taken concurrently) and AVMT 43500 (may be taken concurrently) and UNIV 20400 (may be taken concurrently) and UNIV 20600 (may be taken concurrently)

AVMT 49800 - Aviation Internship (0-4)
Students are placed in various aviation-related positions, arranged with an advisor, to provide them with on-the-job experience. A minimum of 120 contact hours required.
Class Restrictions: Must be enrolled in one of the following Classes: Junior or Senior.

AVMT 49900 - Independent Study (3)
This course is designed to meet the needs of aviation majors by allowing them to study an advanced topic not found in regular courses.
Class Restrictions: Must be enrolled in one of the following Classes: Junior or Senior.

AVTR 10100 - Fundamentals of Flight (2)
Flight students will learn the fundamental principles of flight and the operation of aircraft, while implementing Lewis University Aviation procedures and operating parameters along with Aeronautical Decision Making (ADM). Students will complete Computer-Based-Training (CBT) flight modules utilizing flight simulation software.

AVTR 10200 - Introduction to Aviation and Transportation (1)
This general course is designed to acquaint students with the many aspects of and career opportunities inaviation and transportation industries.

AVTR 12000 - Unmanned Systems Electricity (4)
This course teaches students the fundamentals of electricity as it relates to Unmanned System applications. Topics include generators, motors, batteries, electrical circuit components, wiring diagrams, soldering, and multi-meter operation.
Prerequisite: PHYS 13000

AVTR 13000 - Private Pilot Ground 1 (3)
This course introduces students to the basic principles of flight, aircraft systems and performance, basic meteorology and weather data interpretation, basic radio navigation, physiology, flight planning and decision making. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141.
Prerequisite: AVTR 10100 (may be taken concurrently)

AVTR 13100 - Private Pilot Ground 2 (3)
This course helps students prepare for the Private Pilot written examination through advanced study of the principles of flight, aircraft systems and performance, meteorology and weather data interpretation, radio navigation, physiology, flight planning and decision making This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141.
Prerequisite: AVTR 13000

AVTR 13200 - Private Pilot Flight Lab 1 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for a private pilot certificate with an airplane category rating and single-engine class rating. The lab consists of dual flight instruction, solo flight training and appropriate ground instruction. The credit hours will post to the student's transcript upon completion of the FAA Private Pilot Practical Exam.
Prerequisite: AVTR 10100

AVTR 13300 - Private Pilot Flight Lab 2 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for a private pilot certificate with an airplane category rating and single-engine class rating. The lab consists of dual flight instruction, solo flight training and appropriate ground instruction. This is the second part of the two-part private pilot course sequence.
Prerequisite: AVTR 13200

AVTR 13500 - Introduction to Flight (3)
This course introduces students to the basic principles of flight, aircraft systems and performance, basic meteorology, weather data interpretation, basic radio navigation and physiology.

AVTR 20100 - Human Factors (3)
Human factors encompass all of those considerations that affect people at work. This course provides a comprehensive discussion of the human factorsinvolved insurface, maritime, andair transportation. It deals not only with an examination of human physiology, but also with an exploration of the interactions between people and their work environment, as well asbetween fellow workers and crew membersThe process of human decision making is extensively explored

AVTR 20300 - Visual Aircraft Recognition 1 (1)
This course focuses on visual identification of both heavier-than-air and lighter-than-air aircraft, including private, corporate airline and military aircraft, as well as gliders and helicopters. The course also gives students appreciation of different classes of aircraft and their levels of performance.

AVTR 20400 - Aviation Regulations (3)
This course provides a practical approach to the complex subject of aviation regulations. The focus is on the mission, functions and relationship of the various groups involved in the regulatory process.

AVTR 20500 - Visual Aircraft Recognition 2 (1)
This course further expounds on visual identification of aircraft which are heavier-than-air and lighter-than-air, along with private corporate airline, and military aircraft, including gliders and helicopters.

AVTR 21300 - Aviation History 1: Barnstorming to "A" Bombs (3)
From the beginnings of human flight through 1945, this course is a historical account of the people and their flying machines. The course also includes events and important dates that are likely to shape the future of aviation.

AVTR 21400 - Aviation History 2: The Jet Age (3)
Subsequent to the conclusion of World War II in 1945, aviation technology accelerated the development and improvement of the jet engine, exploited the capabilities and performance of larger propeller aircraft and ushered in the realization of manned space flight. This course chronicles the achievements of the pioneers in flight, design and manufacturing who were instrumental in the aeronautical advances across commercial, military and general aviation.

AVTR 22500 - Introduction to Unmanned Systems (3)
This course provides an overview of Unmanned Aircraft Systems. Topics include the history of UAS, regulations, industry and societal implications, career outlooks, ethical considerations, and the basic components required to operate a UAS. The course will also introduce hands-on UAS flight and operation principles through simulation and other means.

AVTR 23100 - Instrument Pilot Ground School (4)
This course deals with the theoretical aspects of instrument flight. Ground school instruction includes basic principles of instrument flying, aviation meteorology, radio navigation and federal aviation regulations and a general understanding of the terminal en route instrument flying procedures. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141.Students who do not possess a Private Pilot SEL certification may be removed from the course.
Prerequisite: AVTR 13000 and AVTR 13100 and AVTR 13300

AVTR 23200 - Instrument Pilot Flight Lab 1 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for an instrument rating (airplane). Flight and simulator training in basic attitude instrument flying; VOR, NDB and GPS navigation; ILS approach procedures, holding pattern entry and procedures; and IFR cross country procedures are covered. The credit hours will post to the student's transcript upon completion of the FAA Instrument Rating Practical Exam.
Prerequisite: AVTR 13300

AVTR 23300 - Instrument Pilot Flight Lab 2 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for an instrument rating (airplane). Flight and simulator training in basic attitude instrument flying; VOR, NDB and GPS navigation; ILS approach procedures, holding pattern entry and procedures; and IFR cross country procedures are covered. This is the second part of the two-part Instrument pilot course sequence.
Prerequisite: AVTR 23200

AVTR 25000 - Aviation Meteorology 1 (3)
This course covers basic meteorological fundamentals, including temperature, turbulence, icing, thunderstorms and clouds. The Aviation Weather Service Program includes various weather reports, forecasts and low altitude charts. 60 Contact Hours (45 lecture/15 lab) Meteorologicalphenomena affecting surface and maritimetransportation are also considered.
Attributes: Experiential Learning Gen Ed, Science General Education

AVTR 25100 - Unmanned Systems (3)
This course focuses on the payload systems capable of being installed on air (UAV), ground (UGV), and water-based platforms (UMV). Students will learn and apply these systems to working platforms and learn how to utilize them in the field.
Prerequisite: AVTR 34300 and AVTR 22500

AVTR 25200 - Aviation Meteorology 2 (3)
During this continuation study of atmospheric phenomena and their relation to aircraft operation, students learn the proper way to obtain a weather briefing, interpret high altitude charts and other information for flight planning purposes.
Prerequisite: AVTR 25000
Attributes: Science General Education

AVTR 25500 - Aviation Weather (3)
This course covers basic meteorological fundamentals including temperature and heat transfer, clouds, air masses, frontal systems, precipitation; instability; icing and storms (thunderstorms and hurricanes). Basic understanding of various weather reports, forecasts, and charts. The course also covers meteorological phenomena affecting surface and maritime transportation.

AVTR 26300 - Aircraft Maintenance for Pilots (3)
Students learn about routine and preventative aircraft maintenance that may be performed by owners and pilots, including, but not limited to, repair of landing gear tires, service of landing gear shock struts, service of landing gear wheel bearings, replenishment of hydraulic fluid, troubleshooting and repair of landing light circuits, replacements of bulbs or lenses and replacement or cleaning of spark plugs.

AVTR 30000 - Professional Development for Aviators (1)
This course teaches students the fundamental concepts of internship acquisition, resume building, networking, interview preparation, and professionalism in the aviation industry.

AVTR 30500 - Crew Resource Management (3)
This course examines the common concepts of crew resource management as developed by major air carriers. Topics include supervision of crew members, counseling, accountability, coordination and relationship of authority.

AVTR 31100 - Introduction to Air Traffic Control (3)
A comprehensive examination of the U.S. national air traffic control system and how it affects aviation in general, and pilots and safety in particular, this course covers the air traffic control system (enroute, terminal and Flight Service Stations), air traffic control personnel, training, duties and facilities.

AVTR 31300 - Air Traffic Control Systems (3)
A comprehensive examination of the U.S. national air traffic control system and how it affects aviation in general, and pilots and safety in particular, this course covers the air traffic control system (enroute, terminal and Flight Service Stations), air traffic control personnel, training, duties and facilities.
Prerequisite: (AVTR 13000 or AVMT 10600)

AVTR 32000 - Advanced Aircraft Systems (3)
This study of aircraft systems includes hydraulics, air-conditioning, cabin pressurization, anti-icing systems, fuel systems, electrical systems, landing systems, flight control systems, fire-detection systems and pneumatic systems. Completion of the course gives students operational understanding of the system of high performance aircraft, including turboprop and other turbine engines.

AVTR 32100 - Transportation Legislation (3)
A comprehensive study oftransportation law, this course covers regulatory statutes and federalregulations. Students are also introduced to civil and criminal law as applied to transportation, including such aspects as operation, contracts, insurance, liability, litigation and case law.

AVTR 33100 - Commercial Pilot Ground School (3)
This course assists students in preparing for the Commercial Pilot written exam. Classroom instruction includes advanced maneuvers, Federal Aviation Regulations, aerodynamics, weather and safe operation of aircraft. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141. Students who do not possess a Private Pilot SEL certification with an Instrument Rating may be removed from the course.
Prerequisite: AVTR 23100 and AVTR 23300

AVTR 33200 - Commercial Pilot Flight Lab 1 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for a commercial pilot certificate with an airplane category rating and single-engine class rating. Students are introduced to commercial maneuvers and complex/high performance operations. The credit hours will post to the student's transcript upon completion of the FAA Commercial Pilot Practical Exam.
Prerequisite: AVTR 23300

AVTR 33300 - Commercial Pilot Flight Lab 2 (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for a commercial pilot certificate with an airplane category rating and single-engine class rating. Students are introduced to commercial maneuvers and complex/high performance operations. This is the second part of the two-part Commercial pilot course sequence.
Prerequisite: AVTR 33200

AVTR 34100 - Unmanned Systems Field Operations (3)
Students will obtain relevant industry experience by taking part in actual unmanned operations in the field. Students will apply fundamental mission creation parameters and successfully achieve objectives.
Prerequisite: AVTR 34300 and AVTR 44300

AVTR 34200 - Aerodynamics (3)
This course is designed to provide the student with the foundational and fundamental knowledge sets pertaining to aerodynamics. This course will improve student understanding of aerodynamic laws and principles.

AVTR 34300 - UAS Operations 1 (3)
This course focuses on the specific components of the Unmanned Aircraft System. Piloting and payload and sensor operations are covered along with datalinks and autonomous systems. Students will continue developing their operations skillsets as they determine which UAS role is appropriate for different scenarios. This course also introduces UAS Crew Resource Management (CRM) concepts, mission planning, and pertinent UAS regulations.
Prerequisite: AVTR 13500 and AVTR 13000

AVTR 35000 - Advanced Air Mobility (3)
This course provides an in-depth exploration of Advanced Air Mobility (AAM), an emerging aviation ecosystem that integrates innovative aircraft, automated flight systems, and next-generation airspace management to enable safe, efficient, and sustainable air transportation. Students will examine the technological, regulatory, economic, and operational foundations driving AAM, including electric vertical takeoff and landing (eVTOL) aircraft, uncrewed aircraft systems (UAS) integration, autonomy, airspace modernization, and infrastructure planning. Through case studies, system-level analysis, and scenario-based learning, the course investigates key challenges such as airworthiness certification, detect-and-avoid (DAA) architectures, vertiport design, cybersecurity, environmental impacts, community acceptance, and integration with traditional National Airspace System (NAS) operations. Emphasis is placed on understanding FAA and international regulatory frameworks, emerging industry standards, and the evolving roles of stakeholders in government, industry, and academia. Students will engage in project-based work to design conceptual AAM operational models, evaluate enabling technologies, and assess scalability for urban, suburban, and rural applications. By the end of the course, students will be prepared to critically analyze the feasibility and implications of AAM systems and contribute to the advancement of this rapidly developing aviation sector.
Prerequisite: AVTR 34300

AVTR 35100 - Vertiport Planning and Development (3)
This course examines the planning and design of vertiports supporting Advanced Air Mobility (AAM) and eVTOL operations. Students study site selection, airspace integration, safety standards, energy systems, regulatory frameworks, and environmental considerations. Through case studies and design projects, they evaluate feasibility and develop conceptual vertiport plans, preparing them to support infrastructure planning within the emerging AAM ecosystem.
Prerequisite: AVTR 35000 (may be taken concurrently)

AVTR 35300 - Air Transportation (3)
This survey of the historical developments of air transportation systems covers facilities; impact of regulations; problems encountered in commercial transportation; airline economics, management and organization; role of governments in air transportation; and economic, social, political, and future implications of air transportation. Human dependency on air transportation is ever increasing because of globalization of economies and the need to make great use of scarce time. It is therefore of prime importance for students in aviation, particularly those in flight, to study the development of the industry and how it affects society and the economy.

AVTR 37300 - Transportation Safety Management Systems (3)
The objective of this course is to introduce students to safety management systems applied to transportation safety programs through a study of proactive, preventative risk management processes that include hazard identification and mitigation.
Prerequisite: ENGL 11200 (may be taken concurrently)
Attributes: Advanced Writing, Experiential Learning Gen Ed

AVTR 39000 - Workshop in Aviation and Transportation (1-3)
Workshops in Aviation and Transportation are designed to provide information on current issues in these fields of study. The workshops are taught by professionals who have expertise in a given area. Students are encouraged to select workshops based on their individual needs and interestsand on potential application upon graduation.
Attributes: Workshop/Seminar

AVTR 39700 - ST: Aviation and Transportation (3)
This is a special topics course. Students are given the opportunity to study concepts, structures, theories, laws, operations, systems, resources, and other contemporary topics pertinent to aviation and transportation industries Subject matter will vary, please refer to the course syllabus for more detailed course description.

AVTR 40200 - Fiscal Aspects of Transportation (3)
This course provides an introduction to financial management problems encountered intransportation management. Topics covered include basic accounting, financial management principles, cash flow analysis, budgeting and financial statement analysis.

AVTR 40800 - Flight Instructor Airplane (CFI-A) Ground School (2)
The course is designed to cover the principles of teaching, as well as the principles of flight instruction, including maneuvers. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141.

AVTR 40900 - Flight Instructor Airplane (CFI-A) Flight Lab (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for a Certified Flight Instructor certificate with an airplane category rating and single-engine class rating. Students also obtain the instructional knowledge required to teach, including the ability to recognize, analyze, and correct of common student errors. The credit hours will post to the student's transcript upon completion of the FAA Certified Flight Instructor Airplane practical exam.
Prerequisite: AVTR 33300

AVTR 41000 - Certified Flight Instructor Ground (3)
This course is designed to cover the principles of instruction and teaching, including the learning process, human behavior, effective communication, teaching methods, principles of flight, maneuvers, and critique and evaluation. This course helps students prepare for the CFI FAA knowledge, oral, and practical tests. Students who do not possess a Commercial Pilot SEL certification with an Instrument Rating may be removed from the course.
Prerequisite: AVTR 33100 and AVTR 33300

AVTR 42000 - Flight Instructor Instrument (CFI-I) Ground (2)
This course is designed to prepare the student to teach instrument flying. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141. Students who do not possess a Commercial Pilot SEL certification with an Instrument Rating may be removed from the course.
Prerequisite: AVTR 33100 and AVTR 33300

AVTR 42100 - Flight Instructor Instrument (CFI-I) Flight Lab (1)
Student obtain the aeronautical skill and experience necessary to teach the principles of attitude instrument flying, ATC procedures and IFR navigation. Students also obtain the instructional knowledge required to teach, including the ability to recognize, analyze, and correct common student errors. The credit hour will post to the student's transcript upon completion of the FAA Certified Flight InstructorInstrument Practical Exam.
Prerequisite: AVTR 40900

AVTR 43000 - Labor Relations in Transportation (3)
This course provides study of unions, labor legislation, collective bargaining, contracts administration and conflict resolution in thetransportation industry.

AVTR 44300 - UAS Operations 2 (3)
This course teaches students how to troubleshoot UAS anomalies. Students will also work in teams to develop and program a UAS to accomplish a certain set of parameters. Operations skillsets will be mastered as students are tasked with increasingly difficult scenarios." Prerequisite: AVTR 34300 (may be taken concurrently)

AVTR 44400 - Electric and Advanced Propulsion in Aviation (3)
This course explores emerging aviation propulsion technologies, including electric, hybrid-electric, hydrogen, distributed systems, and sustainable fuels. Students examine core engineering principles, energy storage, fuel cells, system integration, certification, and environmental impacts. Through case studies and applied analysis, they evaluate design tradeoffs, technology readiness, and real-world industry developments, preparing them to assess and advance next-generation sustainable aircraft systems.
Corequisite: AVTR 35000

AVTR 45000 - Issues and Trends in Transportation (3)
This course presents an analysis of selected contemporary issues, problems and trends facing various segments of the transportation industry (manufacturers,government, and other stakeholders in surface, maritime, and air transportation). Students apply previously learned principles to practical problems in thetransportation industry.
Prerequisite: (AVTR 35300 (may be taken concurrently) or AVTR 50000 (may be taken concurrently)) and BSAD 20000 (may be taken concurrently)

AVTR 45100 - Airport Operations Workshop (1)
An introduction to airport operations, this course covers the analysis of the role of the department manager in the daily operation of an airport, inspections, emergencies, planning, maintenance and safety.

AVTR 45200 - Airport Management (3)
A comprehensive study of airport operations and management, this course covers analysis of the role of the airport manager in the daily operation of an airport, finance and administration, public relations, social, political and environmental considerations; operations, safety; and facility maintenance.

AVTR 45300 - Airline Management and Economics (3)
Few industries are as important to the economic and social well-being of a nation as transportation. Aviation is an integral part of the infrastructure of a global economy. Yet, since the beginnings of the industry in the 1920's, as a whole, airlines have struggled to earn a sustainable profit. This industry has long faced significant structural impediments toward achievement of that basic objective. This course explores these challenges, but also studies the innovative methods utilized by airlines to overcome and be successful in aspects of this global industry.

AVTR 46000 - Multi-Engine (MEL) Ground School (2)
This course provides the necessary instruction to thoroughly familiarize students with the theory of safe and practical multi-engine operation. This course helps students prepare for the FAA knowledge, oral, and practical examinations. Meets requirements of 14 CFR 141. Students who do not possess a Commercial Pilot SEL certification with an Instrument Rating may be removed from the course.
Prerequisite: AVTR 33100 and AVTR 33300

AVTR 46100 - Multi-Engine (MEL) Flight Lab (1)
Students obtain the aeronautical skill and experience necessary to meet the requirements for the addition of an airplane multi-engine land class rating to an existing pilot certificate. Students are introduced to multi-engine aerodynamics, operating procedures, systems, performance considerations and emergency procedures. The credit hour will post to the student's transcript upon completion of the FAA Commercial Pilot Multi-Engine Land Practical Exam.
Prerequisite: AVTR 33300

AVTR 46300 - Aircraft Accident Investigation (3)
This course provides a study of the general principles and procedures involved in an aircraft accident investigation. Students explore both FAA and National Transportation Safety Board (NTSB) aircraft accident investigative techniques and how the NTSB determines probable cause.
Prerequisite: AVTR 13000 or AVMT 10600
Attributes: Experiential Learning Gen Ed

AVTR 47000 - Flight Instructor-Multi-Engine (CFI MEL) Ground (2)
This course provides the necessary instruction to prepare students to give multi-engine flight training. It also assists students in preparing for the FAA Flight Instructor-Multi-engine Flight Check. Meets requirements of 14 CFR 141.

AVTR 47100 - Flight Instructor-Multi-Engine Flight Lab MEI (1)
Students obtain the aeronautical skill and experience necessary to teach multi-engine aerodynamics, normal and emergency operating procedures, aircraft systems and performance considerations. The credit hour will post to the student's transcript upon completion of the FAA Flight Instructor Multi-Engine Practical Exam.

AVTR 47300 - Airline Transport Pilot (3)
This course covers air transport topics assessed in the FAA ATP and Aircraft Dispatcher Knowledge examinations. This course does not, however, fulfill all the specific training requirements of 14 CFR 156 for a student to be eligible to take the FAA knowledge exam. The overall goal of this course is to introduce aviation students to the larger environment of global airline transport pilot operations. Students learn about Federal Aviation Regulations aircraft systems, the theory of flight, aerodynamics, meteorology with respect to engine operations, and weight and balance computations.
Prerequisite: AVTR 33100 (may be taken concurrently)

AVTR 47500 - Large Jet Familiarization (3)
This course is designed to familiarize the aviation student with the systems on a particular aircraft. The aircraft type may vary from semester to semester. Substituting this course for AVTR 40900 and AVTR 42100 requires permission from the chief of pilot training.
Prerequisite: AVTR 32000 or (UNIV 20400 and UNIV 20600)

AVTR 47700 - UAS Senior Capstone (3)
Students will demonstrate mastery of the entire UAS Program. Students are tasked with designing, building, testing, and further developing a UAS to complete a set of goals set forth by the student and professor of the course. Students also develop a project portfolio to showcase their skillsets to potential employers.
Prerequisite: AVMT 34000 and AVTR 44300

AVTR 48000 - Practical Dispatching (3)
This is a capstone course for dispatcher certification. It includes a detailed review and practical applications of the skills required for Aircraft Dispatch certification. Meets requirements of 14 CFR 65.
Prerequisite: AVTR 47300 (may be taken concurrently) and AVTR 20400 and AVTR 25200 and AVTR 31300 (may be taken concurrently)

AVTR 48200 - ATC Responsibilities and Procedures (3)
Individual controller positions will be explored in depth including the enroute (ARTCC), terminal (TRACON), tower (ATCT) and Flight Service Station specialist's responsibilities with respect to aircraft separation, inter-facility coordination and the expeditious, safe movement of aircraft. Additionally, an in-depth study of letters of agreement, position briefings and the use of departure, arrival and enroute progress strips will be included.
Prerequisite: AVTR 20400 and AVTR 23100 and AVTR 31300

AVTR 48400 - Radar Fundamentals and Separation Minima (3)
Equipment capabilities and limitations of radar will be addressed in sufficient depth to prepare future controllers for successful careers. Separation minima for radar and non-radar operations will be emphasized and reviewed as an integral part of the controller's core responsibilities. VFR IFR operations will be differentiated and defined for a full understanding of their differences.
Prerequisite: AVTR 23100 and AVTR 31300
Corequisite: AVTR 48401

AVTR 48401 - Advanced Radar Fundamentals Separation Minima Lab (1)
This course involves the introduction of the principles set for in FAA Order 7110.65. Separation minima for radar and non-radar operations will discussed, learned, and applied as part of the controller's responsibilities along with radar identification, beacon systems, radar approaches and departures, and aircraft separation. Students will begin to separate aircraft in the approach and departure control environment utilizing Air Traffic Control radar simulation.
Corequisite: AVTR 48400

AVTR 48500 - Flight Deck Automation (3)
State of the art cockpits employ high technology "glass" avionics to enhance the flight crew's situational awareness, reduce workload and greatly increase and maximize efficiency in terms of fuel savings and equipment longevity. This course addresses the challenges and benefits of various new-age cockpits in the air carrier inventory with particular emphasis upon the CRJ-200 flight management system. Coursework in this class will strengthen students' knowledge and competency in an aviation environment dominated by these highly advanced flight guidance concepts.
Prerequisite: AVTR 23100

AVTR 48600 - Aircraft Capabilities and Characteristics (3)
Employing previous course work and acquired knowledge, an in-depth investigation of IFR flight operations and Air Traffic Control facilities services afforded VFR aircraft will be emphasized. Additionally, aircraft capabilities characteristics and performance will be addressed in order to provide each future air traffic professional with a keen understanding and anticipation of an aircraft crew responses to controller clearances and requests.
Prerequisite: AVTR 23100 and AVTR 31300

AVTR 48700 - ATC Tower Ground Control (3)
Students will learn correct procedures for moving aircraft and vehicles within the movement areas of an airport with an operational air traffic control tower. They will learn correct phraseology, rules, and procedures from the FAAO 7110.65. The class will consist of lecture and laboratory simulation of real-time air traffic movement.
Prerequisite: AVTR 31300 and AVTR 48200
Corequisite: AVTR 48701

AVTR 48701 - ATC Tower Ground Control Lab (1)
Students will discuss, learn, and begin applying correct procedures for the separation of aircraft on the taxiways, runways, and within the Class D surface area of an airport with an operational control tower. The students will apply correct phraseology, rules, and procedures from FAAO 7110.65. They will interpret and apply radar data using the ADSE display. Students will begin to control aircraft using laboratory simulation of real-time air traffic movement.
Corequisite: AVTR 48700

AVTR 48800 - Advanced Radar Fundamentals (3)
This course involves the careful examination of Advanced Radar Fundamentals and minimums set forth in FAA Order 7110.65. Equipment capabilities and limitations of radar (both ground-based and satellite-based) will be addressed in-depth to prepare future controller for successful careers. Separation minima for radar and non-radar operations will be emphasized and reviewed as an integral part of the controller's responsibilities along with radar identification, beacon systems, radar approaches and departures, and aircraft separation.
Prerequisite: AVTR 48400

AVTR 48801 - Adv Radar Fund Lab (1)
This course involves the application of the principles set forth in FAA Order 7110.65. Separation minima for radar and non-radar operations will be applied as part of the controller's responsibilities along with radar identification, beacon systems, radar approaches and departures, and aircraft separation. Students will separate aircraft in the approach and departure control environment utilizing Air Traffic Control radar simulation.
Corequisite: AVTR 48800

AVTR 49100 - ATC Tower Local Control (3)
Students will learn correct procedures for the separation of aircraft on the runways and within the Class D surface area of an airport with an operational control tower. The students will apply correct phraseology, rules, and procedures from FAAO 7110.65. They will learn how to interpret radar data using the ADSE display. The class will consist of lecture and laboratory simulation of real-time air traffic movement.
Prerequisite: AVTR 48700

AVTR 49101 - ATC Tower Local Control Lab (1)
Students will learn correct procedures for the separation of aircraft on the runways and within the Class D surface area of an airport with an operational control tower. The students will apply correct phraseology, rules, and procedures from FAAO 7110.65. They will interpret and apply radar data using the ADSE display. The class will use laboratory simulation of real-time air traffic movement.
Corequisite: AVTR 49100

AVTR 49500 - Internship in Transportation Administration (3)
This internship is designed to provide on-the-job experience in an appropriate transportation agency. Students are supervised by the agency, and their progress is monitored by the department. Students must submit a report on the internship experience.

AVTR 49600 - Air Traffic Control Internship (3)
This internship is designed to provide students with on-the-job experience and skill sets in an appropriate aviation agency. Students are supervised by the agency, and their progress is monitored by the department. Three credit hours are earned at the satisfactory completion of all the requirements of the internship. The student must submit a report on the internship experience.

AVTR 49800 - Internship or Field Placement (0-3)
This internship is designed to provide students with on-the-job experience in an aviation/aerospace industry or a government agency. Students are supervised by the organization with which they are doing the internship and their progress is also monitored by the department. Students may earn a maximum of three hours of credit upon completion of the internship and submission of an intern paper or report.
Class Restrictions: Must be enrolled in one of the following Classes: Junior or Senior.

AVTR 49900 - Independent Study (1-3)
This course is designed to meet the needs of majors inDepartment of Aviation and Transportation programs who want to study an advanced topic not found in regular courses.
Class Restrictions: Must be enrolled in one of the following Classes: Junior or Senior.

AVTR 50000 - Overview of the Aviation and Transportation Industry (3)
The student will study the transportation industry's process of moving people and cargo around the world. Topics will include governmental regulation and the associated security concerns/procedures.

AVTR 51000 - Strategic Planning for Aviation and Transportation (3)
The student will study current trends in aviation/ transportation fiscal management from the perspective of project development and monitoring, including accounting, budgeting and purchasing. Studies in innovative and strategic financial decision-making will be introduced which include issues such as purchasing vs. leasing, outsourcing, and fractional ownership.

AVTR 53000 - Regulatory Systems for Aviation and Transportation (3)
Governmental bodies, domestic trade organizations and international advisory groups issue regulations, guidelines and procedural standards which directly impact transportation. This course highlights the degree to which regulation shapes the industry.

AVTR 54000 - Safety Management Systems for Aviation and Transportation (3)
A Safety Management System (SMS) is a dynamic management system based on Quality Management System (QMS) principles in a structure scaled appropriately to the operational risk, and applied in a safety culture environment in aviation and transportation. Safety management must be a cardinal priority for every transportation organization, including private enterprise and regulatory agencies. This course will cover not only concepts of SMS, but also the history of quality management, and present critical QMS concepts such as quality tools, strategic planning, deployment, statistical performance measurement, leadership/ management, and documentation.

AVTR 54500 - Transportation Operations in Supply Chain and Logistics (3)
Students will be introduced to a supply chain perspective within the complex environment in which transportation service is delivered. The course provides a framework and foundation for the role of multiple modes of transportation in the logistical movement of goods within the various modes. Global transportation topics include fuel, energy, managerial, economic, and environmental issues.

AVTR 55000 - Implementing Safety Management Systems (3)
This course will examine issues associated with implementing a safety management systems program in aviation and transportation. Topics will include a review of SMS, review of human factors, and examine best practices for implementing SMS.

AVTR 55500 - Transportation Security and Operational Resilience (3)
The student will study the transportation industry's security concerns in a comprehensive manner and address security issues along with solutions to minimize risk.

AVTR 56000 - Human Resource Management and Labor Relations (3)
A study of the role of human resource management including hiring practices, initial employee training, professional development, and establishing employee benefit packages. Ethical concerns underlying labor relations, employee dissatisfaction, collective bargaining, labor/management conflicts, and other human resource management issues and trends will be discussed.

AVTR 57000 - Current Practices and Future Trends (3)
Select studies of contemporary issues and future trends in aviation and other transportation industries. Topics may include such contemporary practices as incorporating Unmanned Aerial Vehicles into the National Airspace System, airspace capacity and the Next Generation Air Transportation System, planning responses to intermodal transport systems, and current trends in transportation security. This course could identify potential applied research studies.

AVTR 58000 - Special Topics in Aviation and Transportation (3)
A select study of issues in aviation and other transportation industries. Topics will vary.

AVTR 58100 - Unmanned Autonomous Systems (3)
This course will provide an overview of Unmanned Systems. Topics include the history of unmanned systems, regulations, industry and societal implications, and ethical considerations regarding the unmanned industry. The course will also introduce hands-on unmanned flight and operation principles through simulation and other means.

AVTR 58200 - Applied Research (3)
Under professor supervision, students will work in a small group on a research project and submit a written proposal with the intent of carrying out applied aviation research and reporting findings in a publication or poster. Students will model ethical and professional research etiquette, consistent with CITI.

AVTR 58300 - Fatigue Risk Management Systems (3)
This course will explore the science behind human performance in relation to fatigue, the regulations that govern transportation operations with regards to fatigue, and the administration of a fatigue risk management system (FMRS).

AVTR 58400 - Economics in Aviation and Transportation (3)
Economic applications to the aviation industry including the economics of an airline and how economic problems are analyzed. Demand analysis and its relation with price and economic conditions. Costs and supply and the interaction of demand. An in-depth examination of the economic aspects of the air transportation industry, with microeconomic analysis applied to decision making in the airline, general and corporate aviation, and airport businesses. Topics include: basic economics of air transport supply and demand; demand forecasting; cost drivers; network structures and strategies; ratemaking; yield, revenue and capacity management; regulatory issues; political influences; unique economic characters of international commercial aviation; capitalization and credit facilities; economic and structural analytical tools and models.

AVTR 58500 - Evolution of Air Traffic Control Systems (3)
This course will examine the evolution of the air traffic control system in the United States and explore its future. Students will study the growth and evolution of the United States Air Traffic Control System, understand its operation, and explore concepts of future operation.

AVTR 58600 - Ops Resrch for Aviation & Tran (3)
This course will provide students with a sound conceptual understanding of the role that operations research plays in the decision-making process. Operations research, also known as management science or decision science, is an approach to decision making based on the scientific method, and makes extensive use of quantitative analysis.

AVTR 58700 - Leadership for Aviation and Transportation (3)
Leadership in organizations is about much more than simply barking orders. It sets the tone for communication, establishes and shapes the group culture, guides strategy, and ensures a sustainable future – or, it can jeopardize all of those when leadership isn't purpose-driven and effective. This course examines the philosophy of good leadership and applies elements to practical aviation examples, focusing on leading in a public/private balance, in a highly regulated industry, and in a multinational setting. This course examines individual leadership strengths and how to expand one's positive influence as a leader.

AVTR 58800 - Technical Writing in Aviation and Transportation (3)
The purpose of technical writing is to improve the clarity and accessibility of processes, procedures, and documents such as technical manuals, instructions, promotional materials, and safety guidelines. In this course, students learn how to draft technical documents (reports, instructions, manuals, proposals, user-tests, etc.) solve problems, conduct job related research, and explain professional content to both wide and expert audiences. Students work with technical documents and procedures to run user-tests, offer revisions, and improve usability.

AVTR 58900 - Human Factors and Psychology in Aviation and Transportation (3)
This course explores the fundamentals of human factors in aviation. Human factors essentially focuses on the interaction between humans and technology. Human factors is a multidisciplinary field that is applicable to diverse areas of the aviation domain (pilot & crew operations, aircraft maintenance, spaceflight operations, aircraft interface design, unmanned aerial system operations, air traffic control, etc.). Drawing on concepts from experimental psychology, cognitive science, and system design, the application of human factors knowledge to the interaction with aviation systems results in many benefits including but not limited to, enhancing productivity, increasing safety, reducing user stress, and enabling new capabilities.

AVTR 59100 - Lean Six Sigma for Aviation and Transportation (3)
Six Sigma's main goal is to continuously improve the process outcome through identifying and eliminating the defects as well as reducing variables within the process. It is a set of statistical tools and methods that are used within Six Sigma projects to reduce defects, increase profits or increase customer satisfaction.

AVTR 59200 - Sustainability for Aviation and Transportation (3)
This course focuses on aviation sustainability primarily from a fuels perspective. Topics include: the petroleum supply chain from oil exploration, to refining, then transportation, and finally use in aircraft. Furthermore, combustion principles, chemistry, exhaust emissions, and fuel testing procedures will be explored. Airline operations as well as airport design will also be covered exploring ground operations, flight routing, support equipment, and alternative energy. Grading for this course will be approximately 2/3 individual work and 1/3 group work.

AVTR 59300 - The Commercial Space Industry (3)
This course focuses on the commercial space industry from a technical perspective. Topics include the history of both the United States and Soviet Union space programs, terminology, rocket design and fuels, the commercialization of space, and non-government rocket launch providers. In addition, orbital dynamics will be covered for low-Earth orbits, Earth-Moon system, and interplanetary orbits. This course is designed to provide a working level knowledge of the commercial space industry. Grading for this course will be approximately 2/3 individual work and 1/3 group work.

AVTR 59500 - Research Methods 1 (3)
This course introduces students to both quantitative and qualitative research methods useful for academic and professional inquiry in aviation and transportation studies. The course also focuses on identifying the types of methodologies best suited for investigating different types of problems and questions. The course will provide students with the knowledge of: how to develop research questions; an introduction to statistics used in research; an understanding of the responsible and ethical conduct of research; and use of APA style in research writing.

AVTR 59600 - Research Methods 2 (3)
This course is sequential to Research Methods 1. Students will be expected to draw from and actualize the research methods and theory previously taught in Research Methods 1 through additional performance of statistical analysis. With instructional oversight, students will be required to work individually and complete one original research project proposal to demonstrate and refine their skills as researchers. Prerequisite: AVTR 59500 (may be taken concurrently)

AVTR 59700 - Capstone Experience (3)
This course is designed for the student completing the Masters Degree in Aviation and Transportation. The student will employ acquired knowledge through one of the following options: Thesis (students selecting this option must meet at scheduled times with an advisor); Practicum/ Internship (requires a journal, culminating paper, and comprehensive exam); or Development and Presentation of Case Study/Action Plan.