

Aeronautical Science (AS)

Courses

AS 120 Principles of Aeronautical Science 3 Credits (3,0)

An introductory course in Aeronautical Science designed to provide the student with a broad-based aviation orientation in flight-related areas appropriate to all non-Aeronautical Science degree programs. Subjects include historical developments in aviation and the airline industry; theory of flight; airport operations; aircraft systems and performance; elements of air navigation; basic meteorology theory; air traffic principles; flight physiology; and aviation regulations and safety. Not available to Aeronautical Science students, students with FAA pilot certificates, or students who have credit for AS 121.

AS 121 Private Pilot Operations 5 Credits (5,0)

This course develops the aeronautical knowledge required for certification as a Private Pilot with an Airplane Single Engine Land rating. Topics include: regulations, safety, pre-solo operations, cross-country planning, airspace, chart use, communications, weather, performance, weight and balance, aerodynamics, and decision-making. Students must register for the same section of AS 121 and ASC 101. A grade of C or better is required in any program, minor or area of concentration requiring AS 121.

Corequisites: ASC 101

AS 199 Special Topics in Aeronautical Science 1-6 Credit

Individual independent or directed studies of selected topics.

AS 220 Uncrewed Aircraft Systems 3 Credits (3,0)

Survey of uncrewed aircraft systems (UAS); military and commercial history, growth, and application of UASs; basic acquisition, use, and operation of UAS with an emphasis on operations.

AS 221 Instrument Pilot Operations 3 Credits (3,0)

This course develops aeronautical knowledge required for addition of an Instrument Airplane rating to a Private Pilot certificate. Topics include instrument flying regulations, safety, operations, navigation systems, chart use, weather, flight planning, decision-making, and crew resource management. A grade of C or better is required in any program, minor or area of concentration requiring AS 221.

Prerequisites: AS 121

AS 222 Uncrewed Aircraft Systems Security 3 Credits (3,0)

Sophomore level seminar course focused on the concepts of UAS security and protection. Examination of security engineering, vulnerability, and malicious attack. Formulate opinions and strategies for protecting systems and assets from danger; understanding implications of ignoring security concerns.

Prerequisites: AS 220 and UA 100

AS 235 Uncrewed Aircraft Systems Operation and Cross-Country Data Entry 3 Credits (3,0)

Core technologies of uncrewed aircraft systems. Examination of design concepts, powerplants, control systems, and communication technologies utilized in current uncrewed aircraft systems. Emphasis on technical capabilities, best applications, and operational best practices of cross-country flight planning for modern UAS platforms.

Prerequisites: AS 220 and UA 100

AS 237 UAS Applications in Aerial Photography 3 Credits (3,0)

Guidelines, regulatory standards, and practical considerations for aerial photography and videography techniques using uncrewed aircraft systems (UAS). Use of current procedures and practical methods as a basis for commercial applications that leverage UAS technologies.

AS 241 UAS Systems Architecture and Integration 3 Credits (3,0)

Basic autonomous aerial vehicle systems, including ground control systems; communications and datalinks; airframe; propulsion; navigation; flight control and autopilot; electrical; sensors and payload; launch and recovery. Explores UAS system integration and interoperability; emphasis on component interoperability, effects on system performance, capabilities, and limitations.

Prerequisites: AS 220

AS 254 Aviation Legislation 3 Credits (3,0)

This course examines the evolution of federal civil aviation regulations in the United States. Students will examine the past and present problems prompting regulation of the industry, the resultant safety legislation, airport development, funding, legislation, and international aviation legislation.

AS 299 Special Topics in Aeronautical Science 1-6 Credit

Individual independent or directed studies of selected topics.

AS 309 Aerodynamics 3 Credits (3,0)

Students are provided with an opportunity to explore incompressible flow airfoil theory, wing theory. Topics center on calculation of stall speed, drag, basic performance criteria, configuration changes, high and low speed conditions, special flight conditions, and an introduction to compressible flow.

Prerequisites: PS 113 or PS 150 and MA 112 or MA 241

AS 310 Aircraft Performance 3 Credits (3,0)

This course explores the aerodynamic performance of aircraft powered by reciprocating, turboprop, or jet turbine engines. Additional topics address stability and control, weight and balance, and operating data.

Prerequisites: AS 309

AS 311 Aircraft Engines - Turbine 3 Credits (3,0)

A comprehensive study of aircraft turbine engine fundamentals, theory, and operations. Multiple engine designs, components, and future trends and technologies.

Prerequisites: PS 113 or PS 150 and MA 112 or MA 241

AS 312 Ethics in Aviation Environment 3 Credits (3,0)

This course will introduce the student to decision making and sound business practice based on legal, ethical, moral, and statutory fundamentals. Students will be introduced to legal restraints and model professional rules pertaining to confidentiality and conflict of interest, as well as ethical and cultural issues such as competence and truthfulness as related to legal and aviation related professions. Emphasis will be on restraints placed on the decision-making process required of aviation and business professionals. Prerequisite is junior standing.

Prerequisites: Junior standing

AS 315 UAS Robotics 3 Credits (3,0)

Technologies, systems and control of uncrewed aircraft. A pragmatic exploration of uncrewed aircraft systems, sensors, and their integration; robotic control. Uses guided discussions and hands on learning, including basic programming.

Prerequisites: AS 220 and junior standing

AS 316 Safety Principles of Aircraft Energy Management 3 Credits (3,0)

This course introduces energy safety management as a best practice for pilots to understand, monitor and control the airplane as an energy system. Based on fundamental physics and well-tested applications, the course approaches managing the airplane's energy as a human performance process founded on piloting knowledge, rules, and skills to fly safely.

Prerequisites: PS 113

AS 318 Safety Systems for UAS Operations in Public Safety 3 Credits (3,0)

Exploring safe use of uncrewed aircraft systems to support public safety operations. Examining development of standard operating procedures (SOPs), conducting risk assessment, applying mitigation solutions, integrating safety management systems, and establishing operational emergency response procedures.

Prerequisites: AS 220 and UA 101

AS 319 UAS Law 3 Credits (3,0)

Introduce students to evolving area of UAS law. Familiarize how levels of government, federal (Constitution, statutes, and regulations), state, and local regulate UAS activity. Exposure of various law topics: Constitutional, consumer protection, criminal, product liability, and tort law. Examine FAA rulemaking and enforcement processes. Apply research skills to examine impact of privacy doctrines on UAS operations. Examine legal issues affecting different UAS user groups (government, commercial, recreational).

Prerequisites: Junior Standing

AS 321 Commercial Pilot Operations 3 Credits (3,0)

This course develops aeronautical knowledge required for certification as a Commercial Pilot with Single and Multi-Engine Land ratings. Topics include multi-engine flying in VFR and IFR environments, including high altitude, night, winter, and mountain. Topics also include regulations, safety, weather, aerodynamics, weight and balance, performance, aircraft systems, navigation facilities, chart use, and decision-making. A grade of C or better is required in any program, minor or area of concentration requiring AS 321.

Prerequisites: AS 221 and FA 121

AS 322 Operational and Industrial Aspects of UAS 3 Credits (3,0)

Uncrewed Aviation (UA) management and leadership. UA technologies and program development/project management.

Prerequisites: AS 220 and UA 100 and COM 221

AS 323 Crew Resource Management for UAS 3 Credits (3,0)

Principles of organizational behavior, interpersonal relationship skills, and critical behavioral dynamics used by Uncrewed Aircraft Systems (UAS) crews. Information processing, Human Error, Communications Processes, Problem Solving, Workload Management, and Situational Awareness with particular attention given to dealing with teleoperation and automation in UAS application.

Prerequisites: AS 220 and UA 100

AS 332 Dispatch Aircraft Performance 3 Credits (3,0)

This course explores the aerodynamic performance of jet turbine powered aircraft with a focus on air carrier Dispatch Release development and interpretation. Topics include aerodynamics, turbine engine operation, performance curves, performance parameters, performance theory, weight and balance, and operational efficiency. This course may not substitute for AS 310 in the Aeronautical Science degree

Prerequisites: AS 221 and MA 111

AS 340 Instructional Design in Aviation 3 Credits (3,0)

The application of the method of scientific inquiry to the process of instruction in aviation is presented. This means the systematic design of instruction, based on knowledge of the learning process, taking into account as many factors about the particular situation as possible. Special emphasis will be placed on examining instructional problems and needs in aviation, setting a procedure for solving them, and then evaluating the results.

AS 350 Domestic and International Navigation 3 Credits (3,0)

A study of FAR Part 121 domestic and flag regulations and their impact on long-range domestic and international flights. ICAO, JAA, and FAA operational requirements and typical air carrier Ops SPECS to plan domestic and transoceanic flights; CBT simulation programs may be utilized as necessary to demonstrate actual flight scenarios; High-altitude airspace, navigation, and approach procedure chart interpretation; NAT HLA and RVSM airspace, dispatch procedures, ETOPS, ETP, driftdown, track messages, LRN accuracy checks, Oceanic Air Traffic Control clearances, international METARs and TAFs and emergencies and contingencies while on oceanic tracks; and communication systems requirements and methodology to include satellite, digital, and analog devices.

Prerequisites: AS 221 **Corequisites:** AS 310

AS 356 Aircraft Systems and Components 3 Credits (3,0)

A comprehensive study of aircraft systems and components at the technical level. Areas of study include aircraft electrical, hydraulic, fuel, propeller, and auxiliary systems, including theory of operation, calculations, and related Federal Aviation Regulations. This course is not available for students who have received credit for the AMS systems course.

Prerequisites: PS 113 or PS 150 and MA 112 or MA 241

AS 357 Flight Physiology 3 Credits (3,0)

This course explores aero- medical information. Topics include causes, symptoms, prevention, and treatment of flight environment disorders. Altitude effects, spatial disorientation, body heat imbalance, visual anomalies, and psychological factors are included as they relate to pilot performance and survival effectiveness.

Prerequisites: Sophomore standing

AS 368 UAS Sensing Systems 3 Credits (3,0)

Foundation of remote sensing principles; understanding operation and design of equipment used to gather data from uncrewed and autonomous platforms. Addressing complex mission requirements; selecting appropriate uncrewed and autonomous systems appropriate for a given mission set. Explore sensor acquisition and procurement, installation limitations, and data interpretation.

Prerequisites: AS 220

AS 372 Commercial Helicopter Operations 3 Credits (3,0)

*****OFFERED ON PRESCOTT CAMPUS ONLY*****The student will develop an in-depth knowledge of helicopter components, functions, systems, aerodynamics, and performance at the commercial pilot level. The student will also gain necessary knowledge of en route flight to include weather, navigation, and regulations. By the end of the course, the student will have met the aeronautical knowledge requirements to take the FAA Commercial Pilot Rotorcraft-Helicopter written knowledge test.

AS 380 Pilot Career Planning and Interviewing Techniques 1 Credit (1,0)

A course in which students will discuss and develop short-term and long-term job and career goals, conduct career research using various University and Industry resources, prepare a personal job search portfolio, prepare resumes and letters of application, and gain insights and proficiency in interviewing skills so they are better prepared to enter the job market upon graduation. Students will participate in simulated interview scenarios, will be expected to correspond with at least one company, and will be involved in the evaluation of letters, resumes, and interviews. This course will be graded Pass/Fail. Pre-Requirement: Junior standing

Prerequisites: Junior standing

AS 384 European Aviation Appreciation 3 Credits (3,0)

An experiential, highly participatory course based on research about the European contributions to the development of aviation. Students will study European contributions to past and present aviation and aerospace achievements. If scheduling permits, visits to European aviation museums and airshows are included. Integral to the course is understanding how the historical development of aviation was influenced by each country's unique culture. AS 384 is normally offered in conjunction with the ERAU Study-Abroad program.

AS 387 Crew Resource Management 3 Credits (3,0)

A course designed to develop a detailed understanding of the organizational behavior, interpersonal relationships skills, and other critical behavioral dynamics of professional flight crews. The history of CRM, CRM concepts of communication processes, problem solving, group dynamics, workload management, and situational awareness will be investigated. Aircraft incidents and accidents related to the evolution of CRM training programs and FAA regulations will be analyzed. Intrapersonal and psychomotor skills will be addressed as they relate to safe, legal, and efficient flight operations. This course is a capstone course for the AMS degree, Flight AOC.

Prerequisites: AS 350 and PSY 101 and COM 221

AS 390 Application of UAS Technology 3 Credits (3,0)

Train UAS operators to apply UAS technology to meet contemporary commercial objectives. Education in geographic information systems, extracting payload data, imagery processing and synthesizing captured data to develop commercial products.

Prerequisites: AS 368

AS 399 Special Topics in Aeronautical Science 1-6 Credit

Individual independent or directed studies of selected topics.

AS 402 Airline Operations 3 Credits (3,0)

A study of the scope and function of a major air carrier's organizational structure and the specific relationships of the operations department with those of marketing, maintenance, and safety are discussed. A study of corporate issues including the industry in general, market structure, certification, FAR Part 121 regulations, economic issues, mergers, corporate culture, and international topics will be included. From an operational perspective, topics include flight operations employment policies, domiciles, operating specifications, types of services provided, training, passenger considerations, decision making, communications, and pertinent FARs.

Prerequisites: Junior standing or instructor consent

AS 403 Uncrewed Sensing Systems 3 Credits (3,0)

*****OFFERED ON PRESCOTT CAMPUS ONLY*****This is the capstone course of the Uncrewed Aviation minor, aimed at giving students direct experience with the planning and effective conduct of complex missions involving the proper use of the complex sensing systems on uncrewed aircraft. Through guided discussion and team effort, students will address complex mission assignments by determining the proper sensing system to use, assessing alternate courses of action, selecting and/or designing appropriate uncrewed aircraft equipped with the sensing system appropriate to the mission, and by performing other tasks as required to achieve mission success.

Prerequisites: AS 220 and AS 235 and PS 104 or PS 160 and proof of US citizenship **Corequisites:** AS 403L

AS 405 Aviation Law 3 Credits (3,0)

This course will introduce the advanced student to the U.S. Constitution as well as to federal, state, and local statutes. The student will become familiar with case law and common law and develop an understanding of the chronological development of these laws and their application to aviation. The student will be introduced to civil law, including tort, product liability, contract, sales, secured credit, property, environmental, and labor laws. Criminal statutory law and government, airman, and operator rights and liabilities will also be studied, as well as international laws and conferences.

Prerequisites: COM 221 and Junior standing

AS 408 Flight Safety 3 Credits (3,0)

This course is designed to assist the student in developing an attitude and philosophy for accident prevention and an awareness of major flight security issues. The course includes ideal and practical personal and organizational safety and security procedures and goals; safety philosophies; aircraft accident reports; human factors; principles of accident investigation, accident prevention programs, and accident statistics; current events; NTSB special studies; and the nature of accident/error chains.

Prerequisites: Aeronautical Science senior standing

AS 410 Airline Dispatch Operations 3 Credits (3,0)

Pertinent Federal Aviation Regulations; navigation systems and procedures; manual flight planning; emergency and abnormal procedures; general operating manual; aircraft systems and performance development; human factors; and practical dispatching applications.

Prerequisites: AS 310 or AS 332 and AS 321 or AS 350 **Corequisites:** WX 301 and AT 202

AS 411 Jet Transport Systems 3 Credits (3,0)

Jet transport systems and complex air carrier aircraft systems. Examine air carrier procedures from a crew member's operational perspective.

Prerequisites: AS 356 or permission of instructor

AS 412 Corporate and Business Aviation 3 Credits (3,0)

This course is designed to provide the student with an understanding of the operation of a corporate flight department, value of management mobility, aircraft and equipment evaluation, maintenance, flight operations, administration, and fiscal considerations.

Prerequisites: Junior standing

AS 414 Aviation and the Administrative Law Process 3 Credits (3,0)

This course will introduce the student to administrative law and the role of the Federal Aviation Administration in the rule-making process. Additionally, the student will learn and understand the adjudication and judicial review functions the court exercises over administrative agencies and the process by which they exercise such control.

Prerequisites: AS 254

AS 416 UAS Field Service and Sustainment 3 Credits (3,0)

Uncrewed aircraft systems (UAS) maintenance, inspection, troubleshooting and repair of primary and subsystems.

Prerequisites: AS 220 and junior standing

AS 420 Flight Technique Analysis 3 Credits (3,0)

Application of aerodynamic principles to the development of optimal pilot techniques and procedures. Uniform procedures applicable to all airplanes and special procedures for large, high-performance, and transport aircraft are analyzed, including principles of flight deck resource management.

Prerequisites: AS 310 and AS 435

AS 423 UAS Infrastructure Development and Modeling 3 Credits (3,0)

Foundational infrastructure supporting integration of uncrewed aircraft systems and advanced air mobility into the National Airspace System. Existing air traffic management (ATM) systems; autonomous vehicle integration opportunities and challenges; uncrewed traffic management (UTM); airspace implications; ground support infrastructure requirements; vertiport design.

Prerequisites: AS 323 and junior standing

AS 432 Deploying UAS in Public Safety Flight Operations 3 Credits (3,0)

Conduct basic flight missions encountered by Public Safety Agencies; demonstrate safe operational preparation and deployment strategies for UAS launch and recovery. Understand consequences of ignoring safety concerns; development of standard operating procedures (SOPs), conduct proper risk assessment, applying mitigation solutions, integration of safety management systems (SMS), and creation of operational response procedures. Formulation of strategies to ensure safe and effective public safety operations.

Prerequisites: AS 318

AS 434 Airline Operations Command and Control 3 Credits (3,0)

Students will learn and practice the functions of a typical airline operational command and control center. This multifaceted course will utilize knowledge and skills from several disciplines including: meteorology, dispatch, aircraft performance, safety, air traffic control, and crew resource management. Students will research and apply regulations from FAR part 61, 91, 117, 119, 121, and 135 to real world problems while identifying and solving conflicting priorities within an airline's operational environment utilizing collaborative decision-making strategies and techniques

Prerequisites: AS 402 or AS 410 or WX 410

AS 435 Electronic Flight Management Systems 3 Credits (3,0)

This course teaches the theory and principles governing flight with autopilot and flight management systems. Students will apply theory and principles by demonstrating good decisions and thought processes in autopilot and FMS/PC simulators.

Prerequisites: AS 310 and AS 350

AS 437 Concepts in Advanced Air Mobility 3 Credits (3,0)

Emerging technology and foundational concepts of advanced air mobility. Advanced air mobility concept of operations; autonomous technology, aerial vehicle development, use cases, UAM structure, regulation, implementation plan. Capabilities and limitations of AAM technology; potential implications of integrating advanced air mobility into National Airspace System.

Prerequisites: AS 322 or AS 319

AS 445 Fundamentals of Instructing 3 Credits (3,0)

Fundamentals of instruction as it applies to the aviation industry. Emphasizing the process of learning, teaching, and assessment as they apply to flight and ground instruction in various aviation contexts; FAA regulations, professionalism, safety, and instructional risk management

Prerequisites: PSY 101 and AS 321 or AS 322

AS 472 Operational Applications in Aeronautical Science 3 Credits (3,0)

Culminating experience for students in the Aeronautical Science degree program. Professional industry expectations: real-world application of aeronautical decision-making, crew resource management, threat and error management, diversity and inclusion, and corporate and airline operations. The student must be in senior standing.

Prerequisites: AS 350 and AS 387 and COM 221 and Senior Standing

AS 473 Operational Applications in Uncrewed Aircraft Systems 3 Credits (3,0)

Professional and commercial aspects and operational use of uncrewed aircraft systems. Industry applications for program management, technology adaptation, and regulation. Safe UAS integrations to the National Airspace System with standard, nonstandard, and emergency operations.

Prerequisites: AS 368

AS 474 Operational Applications in Aeronautics 3 Credits (3,0)

Designed to be a culminating experience for students in the Aeronautics degree program. Allows students to explore how their chosen career field fits into the broader aviation industry while examining more deeply issues related to their minor field of study. Provides a macro-level review of the aviation industry and how to prepare to meet industry expectations for those entering the profession. Special emphasis will be on insights into contemporary issues and emerging trends within the industry. Classroom assignments will challenge student critical thinking, collaborative problem solving, written and oral communications, and lifelong learning skills. Prerequisites are COM 221 and students must be a senior in their last or next-to-last semester.

Prerequisites: COM 221 and Senior standing and BSA majors

AS 499 Special Topics in Aeronautical Science 1-6 Credit

Individual independent or directed studies of selected topics.