AVSC 1240 – 001

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: AVSC
Course and Section #: 1240 001
Course Title: Ground II - Instrument
Credits: 3

Course Description

Examines FAA regulations, meteorology, navigation, radio procedures, instrument departures, en route and approach procedures, the instrument airway, and airspace systems as well as aircraft systems operation. Introduces glass cockpit instrumentation. Covers basic flight instrument construction and operation. Prepares pilots for the required FAA Instrument Pilot Airplane Knowledge Test.

Course Attributes

This course has the following attributes:

☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective

Other: *Click here to enter text.*

Instructor Information

Instructor Name: Hollister, Michael Lewis

Student Learning Outcomes

- Explain the principles of instrument flight, including the operation, use and limitations of flight instruments and navigation using GPS, VOR, DME, and ADF.
- Explain the instrument air traffic control system and its functions for controlling aircraft during instrument flight training and IMC flight operations.
- Utilize instrument flight charts for IFR flight planning including becoming familiar with FAR's applicable to instrument flight operations.
- Explain how to execute various IFR departure, and approach procedures including enroute, and arrival operations under IMC conditions.
- Analyze weather information, conditions, and trends while on the ground and in flight, including producing accurate IFR flight plans.
- Explain emergency procedures to gain insight into the psychological factors affecting the pilot decision making process.

Course Materials and Texts

Study References for AVSC 1240:
(NOTE: For a complete list of reference material, see the UVU Instrument Airplane Course Syllabus).

- Instrument Flying Handbook (**IFH**), FAA-H-8083-15B
- Jeppesen Instrument Procedures Guide (**IPG**)
- Federal Aviation Regulations/Aeronautical Information Manual (**FAR/AIM 2025**)

The following are suggested supplemental resources, not necessarily required:

- Instrument Procedures Handbook (IPH), FAA-H-8083-16A
- Pilot's Handbook of Aeronautical Knowledge (**PHAK**), FAA-H-8083-25B (from private pilot).

Technology Tools

- Internet browsers such as Google Chrome or Firefox are preferred. Web browser compatibility can be found at Canvas Questions and Answers.
- Microsoft Office (Word, PowerPoint, and Excel) is required. UVU students have free access to Microsoft 365. See UVU Microsoft Office 365.
- A laptop or desktop computer with a camera and microphone may be required for Kaltura video submission assignments. Instructions for downloading and using Kaltura can be found in the modules where a camera and microphone are necessary. Computer requirements for Kaltura Capture.

1240 Course Outline/Proposed Reading Assignment Schedule
Spring Semester 2025

Jan 6:
COURSE WELCOME AND INTRODUCTION
"Opinion" Quiz

Jan 8:
ORIENTATION & INTRODUCTION TO THE INSTRUMENT FARs and LOGBOOKS
Preparatory Assignment: Read: IFH pg.viii "Maintaining the Instrument Rating"; FAR 61.3(e), 61.51(a-c, g), 61.57(a & g), 91.109(c) & 91.157
Objective: Know and understand the regulatory rules that govern safe and responsible operations in the IFR environment and the responsibilities of the PIC.

Jan 13:
HUMAN FACTORS, AVIATION PHYSIOLOGY and AEROMEDICAL FACTORS
Preparatory Assignment: Read: IFH ch.3.
Objective: Review and understand the elements of human factors for the purpose of improving performance and reducing errors.

Jan 15:
INSTRUMENT SCAN
Preparatory Assignment: Read: IFH ch.6.
Objective: Introduce flight solely by reference to instruments, developing an instrument scan with the flight instruments, and proper power management for stabilized flight.

Jan 22:
AERODYNAMICS REVIEW, AIRCRAFT CONTROL & POWER MANAGEMENT
Preparatory Assignment: Read: IFH ch.4; "Aircraft Control" supplementary reading handout.
Objective: Review basic aerodynamics as it applies to IFR flight and develop a better understanding of aircraft control techniques and proper power management for stabilized flight.

SYSTEMS

Jan 27:
PITOT/STATIC SYSTEMS & RELATED INSTRUMENTS
Preparatory Assignment: Read: IFH Ch.5 pp.1-10, 36-38; PHAK ch.7 pp.1-12 (supplement IFH).
Objective: Develop understanding of the function of the pitot/static system and its related instruments essential for IFR flight, including their interpretation and potential errors and the importance of recognizing changes and failures in instrument indications.

ANALOG GYROS & RELATED SYSTEMS
Preparatory Assignment: Read: IFH ch.5 pp.16-22, 36-38; PHAK ch.7 pp.15-20.
Objective: Develop understanding of the function of the analog gyroscopic instruments and system, including their interpretation and potential errors. Introduce the instrument cockpit check.

Jan 29:
G1000 ADC, AHRS & PFD/MFD USE
Preparatory Assignment: Read: IFH ch.5 pp.22-28; PHAK ch.7 pp.12-15, 20.
Objective: Introduce the G1000 air data computer (ADC), attitude and heading reference system (AHRS), and related flight instruments.

Feb 3:
COMPASS, MAGNETOMETER & HSI SLAVING
Preparatory Assignment: Read: IFH ch.5 pp.10-16; PHAK ch.7 pp.20-26.
Objective: Develop understanding of the magnetic compass, limitations & indications, and use in IFR with inoperative primary instruments. Introduce the magnetometer and HSI slaving.

Feb 5:
RADAR, TRANSPONDER, TCAS, TIS & ADS-B
Preparatory Assignment: Read: AIM ch.4 sec.1 par.15-16 & 20; sec.5, par.1-3, 6-7; IPG ch.1 pp. 9-12 "FAA Radar Systems" up to "Performance-Based Navigation"; AIM 4-4-16 through 4-4-17, 4-5-1 through 4-5-3, and 4-5-7; IFH ch.2 pg.3 "Radar and Transponders", ch.5 pp.28 33 "ADS-B", "TIS" & "TCAS".
Objective: Develop understanding of surveillance radar, ADS-B, related systems and equipment.

Feb 12:
IFR RADIO NAVIGATION (VOR, NDB, ILS, GS, DME)
Preparatory Assignment: Read: AIM ch.1 par.1-1-1 to 1-1-9 & 1-1-12 to 1-1-13; IFH ch.9 pp.1-19 "Basic Radio Principles" through "DME Errors", 35-43.
Objective: Develop an understanding of the function of the various ground-based navigation aids and their related aircraft instruments, including their interpretation and system errors & course setting errors.

Feb 19:
IFR RNAV SYSTEMS (GPS, WAAS & RNP)
Preparatory Assignment: Read: AIM ch.1 par.1-1-15, 1-1-17, 1-1-19 to 1-1-21, and 1-2-1 to 1-2-3; IFH ch.9 pp.22-27 "Area Navigation" through "GPS Substitution for ADF or DME", 33-37 "GPS Errors" up to "IFR Flight Using GPS", 46-48 "Required Navigation Performance" and "Flight Management Systems"; IPG ch.1 pp. 12-15 "Performance-Based Navigation" through "Required Navigation Performance."

Objective: Develop an understanding of the function of the various forms of area navigation systems with emphasis on satellite-based navigation systems, their related aircraft instruments, interpretation and potential errors.

OPERATIONS

Feb 24
DME ARCS, GFC700 FLIGHT DIRECTOR & AUTOPILOT
Preparatory Assignment: Read: IFH ch.9 pp.17-19, 27 (DME Arcs); ch.5 pp.23-28 "Flight Director Systems" through "Multi-Function Display."
Objective: Introduce DME arc procedures. Develop an understanding of the function of the flight director and autopilot in preparation for their utilization in flight management.

IFR EQUIPMENT REQUIREMENTS & AIRWORTHINESS REGULATIONS (MTX Visit)
Preparatory Assignment: Read: FAR 91.7 (civil aircraft airworthiness); 91.9 (civil aircraft flight manual, marking, and placard requirements; 91.205 (general equip requirements); 91.121 & 411 (altimeter); 91.215, 217 & 413 (transponder); 91.171 (VOR); 91.213(d) (inoperative ("inop") equipment).
Objective: Memorize and understand the purpose of aircraft equipment and inspection requirements for IFR flight. Review requirements for any inoperative equipment.

Feb 26:
HOLDING PROCEDURES
Preparatory Assignment: Read: AIM 5-3-8 and 4-4-3(e); IFH ch.10 pp.10-13 (Holding Procedures); IPG ch.3 pp. 18-20 "Holding Procedures, ATC Holding Instructions, Maximum Holding Speed, High-Performance Holding"; "Holding Procedures" handout.
Objective: Introduce holding procedures and their purpose. Develop proficiency in evaluating holding instructions, deciding hold entries, and identifying hold wind correction needs.

Mar 3:
ATC PROCEDURES, CLEARANCES & REPORTING REQUIREMENTS
Preparatory Assignment: Read: IFH ch.2 pp.4-10 "Communication Procedures" through "Center Approach/Departure Control", pp.13-15 "Control Sequence", ch.10 pp.3-5 "Clearances"; AIM 4-1-1 thru 4-1-6, 4-1-20, 4-2-1 thru 4-2-4(a), 4-2-7 thru 4-2-12, 4-4- 1 thru 4-4-12, & 5-2-5. (See handout: **"Pilot/Controller Glossary Selections"**).
Objective: Develop knowledge of ATC function, services and procedures. Develop knowledge of radio communications phraseology. Understand IFR clearances and pilot responsibility.

Mar 5:
APT DIAG/IFR MARKINGS/LIGHTING: ALS, RWY MARKINGS, VISUAL APPROACH INDICATORS
Preparatory Assignment: Read: IPG ch.2 pp.1-7 "Surface Movement Safety" through "Runway Safety"; AIM ch.2.
Objective: Develop the ability to utilize IFR airport diagrams to obtain information critical to departure and arrival and identify operational hazards.

Mar 19:
GENERAL DEPARTURE PROCEDURES & PERFORMANCE
Preparatory Assignment: Read: IFH: ch.10 pp.5-7 "Depart. Procedure."; IPG ch.2 pp.8-24 "Takeoff Minimums" through end of chapter; AIM ch.5 section 2 "Depart. Procedure." & section 5-5-14 "Instrument Departures."
Objective: Develop proficiency in reading, interpreting and evaluating textual and charted Obstacle Departure Procedures (ODPs) and Standard Instrument Departures (SIDs). Develop the ability to identify hazards unique to each procedure as well as their equipment and performance requirements.

Mar 24:
ENROUTE AND ARRIVAL NAVIGATION, CHARTS, ROUTES & ALTITUDES
Preparatory Assignment: Read: IPG chapter 3; FAR 91.177-180; AIM 5-3-4 through 5-3-7, 5-4-1.
Objective: Introduce IFR enroute and terminal arrival procedures. Understand the obstacle clearance role and other purposes of the enroute & arrival navigation structure. Learn and apply the various IFR altitude limitations to enroute operations.9

Mar 26:
GENERAL APPROACH / MISSED APPROACH PROCEDURES & CLEARANCES
Preparatory Assignment: Read: IFH ch.10 pp.13-22 "Approaches"; IPG: Reference chapters 4 and 5; AIM ch.5-4-3 through 5-4-12, 5-4-19 through 5-4-21, 5-4-23 through 5-4-27, 5-5-4 through 5-5-6, 5-5-11, and 4-1-10; FAR 91.175.
Objective: Introduce instrument approach procedures (IAP), applicable regulations, basic IAP charting, ATC clearances, approach segments, and missed approaches. Understand the role of approach procedures in safe landings and general approach procedures.

Mar 31:
PRECISION APPROACH / MISSED APPROACH PROCEDURES & PROFILES
Preparatory Assignment: Read: IPG: Review appropriate sections of ch.5; **Review**: FAR 91.175; AIM 1-1-9.
Objective: Develop the ability to analyze individual procedures, plan for execution and identify hazards unique to each.

Apr 2:
NON-PRECISION APPROACH PROCEDURES & PROFILE (VOR, NDB, LOC, BC, LDA)
Preparatory Assignment: Read: IPG: Review appropriate sections of ch.5; FAR 91.175.
Objective: Develop proficiency in reading, interpreting and evaluating non-precision IAPs. Develop the ability to analyze individual procedures, plan for execution and identify hazards unique to each.

Apr 7:
NON-PRECISION APPROACH PROCEDURES (RNAV), CIRCLING, VISUAL APPROACHES
Preparatory Assignment: Read: IPG: Review appropriate sections of ch.5. AIM 5-1-16, 5-4-23 through 5-4-25, 5-5-11, and 5-5-16; **Review**: IFH ch.10 pp.20-21 "Circling Approaches"; FAR 91.175; AIM 1-1-19 through 1-1-21, 5-4-20(b)(1) "Obstacle Clearance - Circling" and (2)(f) "Circling Minimums", 5-4-21(g) "Missed Approach – Circling."
Objective: Develop proficiency in reading, interpreting and evaluating RNAV IAPs. Develop the ability to analyze individual procedures, plan for execution and identify hazards unique to each. Introduce circle-to-land maneuvering criteria and understand the hazards of circling.

Apr 9:
IFR PLANNING FUEL/EQUIP REQS, ALTERNATES, FILING, REPORTING, LOST COMMS
Preparatory Assignment: Read: IFH ch.10 pp.1-3 through "IFR Flight Plan", 27-33 "Conducting an IFR Flight"; IPG CH.2 pp.12-13 "IFR Alternate Minimums", ch.3 pp.15-16 "Reporting Procedures" through "Communication Failure"; FAR 91.103, 167-169, 173, 183-187; AIM 5-1-1 through 5-1-3, 5-1-5 through 5-1-13, 5-1-15 through 5-1-16, 5-3-1 through 5-3-3.
Objective: Develop the big picture of IFR flight execution by practicing applying knowledge to planning departure-to-destination flying, including recognition of risks or hazards, and planning for alternatives.

Apr 14:
WEATHER PRINCIPLES REVIEW, IFR WX HAZARDS, ICING & DE/ANTI-ICE SYSTEMS
Preparatory Assignment: Read: IFH ch.10 pp.22-26 "Instrument Weather Flying" through "VFR Over-the - Top"; FAR 91.103; PHAK ch.11; AIM ch.7 sect.1 par.22, 26 & 28-29.

Objective: Review and apply weather principles & hazards to IFR flight. Understand the specific threat of aircraft icing that flight in IMC poses including conditions in which airframe and induction icing can form and the risks icing poses. Understand the function, capabilities and limitations of de-ice and anti-ice systems.

Apr 16:
INSTRUMENT (IFR) EMERGENCIES, SITUATIONAL AWARENESS & CFIT/In Class Activity
Preparatory Assignment: Read: IFH Chapter 11; AC 61-134 (GA CFIT).
Objective: Review IFR emergencies and understand the variables that make instrument flying an unpredictable and challenging operation. Review the concepts of "personal minimums" and "currency vs. proficiency" in the IFR environment. Understand the risks of controlled flight into terrain (CFIT) and how to avoid it.

FAA Knowledge Exam (IRA) Results Due: **Wednesday, April 30, 2025 (no exceptions**
General Description of the Subject Matter of Each Lecture or Discussion

Week 1 – Course Introduction/Logbooks
Week 2 – Physiology/Instrument Scan
Week 3 – Aircraft Control/Pitot Static and Gyros Review
Week 4 – G1000/Compass and HSI
Week 5 – RADAR and ADS-B
Week 6 – VOR, ILS, GPS, WAAS and RNP
Week 7 – DME Arcs/Autopilot systems
Week 8 – Holding Procedures/ATC Clearances
Week 9 – Airport Ops/Departure Procedures
Week 10 – Enroute Navigation/Precision Approach
Week 11 – Non-Precision Approach: Ground-based/RNAV
Week 12 – IFR Planning and Alternates
Week 13 – Weather Review
Week 14 – Emergency Procedures/In-class Activity

Required Course Syllabus Statements

Generative AI
You may use AI programs e.g. ChatGPT to help generate ideas and brainstorm. However, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. For example, AI-generated language programs are known to "hallucinate", i.e. create references to non-existent resources. Beware that use of AI may also stifle your own independent thinking and creativity.

You may not submit any work generated by an AI program as your own. If you include material generated by an AI program, it should be cited like any other reference material (with due consideration for the quality of the reference, which may be poor).

Any plagiarism or other form of cheating will be dealt with severely under relevant UVU Plagiarism policies as described in the UVU Student Code of Conduct., UVU Policy 541.

Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX
Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment,

admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.