# AVSC-1120 Basic Air & Space Vehicle Systems



## Instructor Contact Information

#### Instructor Information (https://uvu.instructure.com/courses/533797/pages/instructor-information)

### **Instructor & Course Communication**

Primary: Contact Instructor via Canvas Inbox Messaging.

**Secondary:** You may contact me via mobile and text. See "Instructor Information" link above for additional contact options. I'm always happy to help.

All course communication must be sent through the Canvas messaging system. Instructions on how to contact the instructor through Canvas are found in the <u>Canvas Student Guide</u> (<u>https://mediafiles.uvu.edu/common/student\_guide/index\_url.html?page=page2</u>). Students are required to configure all Announcements and Conversation Messages delivered ASAP to their MyUVU email address in the Canvas-Settings-Notifications Preferences. Students may also configure preferences to receive these and other notifications to their personal email address or cell phone via SMS in addition to their MyUVU email. A video on how to configure your Notification Preferences in Canvas is found in the <u>Canvas Student Guide</u>

<u>(https://mediafiles.uvu.edu/common/student\_guide/index\_url.html?page=page1)</u>. Students must check Canvas or their email regularly for course updates from the instructor as well as additional information regarding this course.

# Course Description

This course introduces the design, installation and operation of basic airframe and propulsion systems, and associated technology, found in light piston-powered, electric, hybrid-electric and turbine-powered fixed wing and rotary-wing aircraft. The course will also explore emerging technologies associated with unmanned aircraft systems (UAS), autonomous large unmanned cargo aircraft, (LUCA), advanced air mobility (AAM), and space vehicles that will be deployed and operated within the National Airspace System and within space.



# O Course Outcomes

Upon successful completion of this course, students will be able to:

- 1. Discuss the theory of flight and the aerodynamic and reaction-type flight control systems found in various aircraft and space vehicle applications.
- 2. Identify the components and operation of basic airframe systems that enable aircraft and spacecraft flight including avionics, instruments, fuel, electrical, hydraulic, cooling, flight control, landing gear, recovery, environmental, and other installed systems.
- 3. Explain the basic theory of operation and application of reciprocating, turbine, electric, hybridelectric, and rocket propulsion systems.
- 4. Demonstrate the theory, design, and operation of thrust producing systems including ducted and unducted fans, propellers, rotary-wing, tilt-rotor, and multi-rotor applications installed on air vehicles.
- 5. Summarize the application of emerging technologies that will impact the design, deployment, and operation to air and space vehicles in the near and medium-term future time frame.

Prerequisites and Needed Skills

## **Course Prerequisites**

• None

## **Technology Expectations**

- Web browser compatibility is found at <u>Canvas Questions and Answers</u> ⇒ <u>(https://community.canvasIms.com/docs/DOC-10720-67952720329)</u>. Internet browsers such as Google Chrome or Firefox work best with Canvas.
- Some course elements may be viewed on mobile devices; however, UVU aviation online courses include elements of instruction that may require the use of a computer.
- Assignments may require the use of a camera and microphone.

# Materials, Fees and Technology Tools

## Textbook

• All textbooks are provided within the course as PDF files sourced from the public domain or are provided as supplementary references as limited PDF excerpts from other textbooks.

## **Technology Tools**

Internet browsers such as Google Chrome or Firefox are preferred. Web browser compatibility can be found at <u>Canvas Questions and Answers</u> ⇒

(https://community.canvaslms.com/docs/DOC-10720-67952720329).

- Microsoft Office (Word, PowerPoint, and Excel) is required. UVU provided free access to Microsoft 365 for students. See <u>UVU Office 365.</u> ⇒ (https://ais-linux6.uvu.edu/office365)
- 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. <u>Computer requirements for Kaltura</u>
   <u>Capture</u> (https://knowledge.kaltura.com/help/kaltura-capture---prerequisites-and-system-requirements).

## How This Course Works

### Course Mode: Online

The delivery method for this course is <u>online</u>. All course requirements must be completed by the scheduled due dates via independent student study.

### Description of how course works:

<u>Canvas</u> is where course content, grades, and communications will reside for this course.

For this **three (3) credit-hour** course students should expect to spend up to **9+ hours a week** completing course activities.

#### Module Flow & Organization

This course consists of 14 modules within 4 topical sections.

- SECTION 1: Flight Theory & Control
  - Modules 1 thru 3 includes topics related to theory of flight and controls for fixed-wing, rotary-wing, and space vehicles.

### SECTION 2: Airframe Systems

- Modules 4 thru 8 will focus on airframe structures and space vehicle re-entry protection, flight and navigation instruments, electrical systems, fuel, environmental, ice and rain protection, hydraulic, and propellers, fans, and rotor systems.
- SECTION 3: Propulsion Systems
  - Modules 9 thru 12 will discuss reciprocating engines, turbine engines, rocket, and electric and hybrid-electric propulsion systems.
- SECTION 4: Emerging Technologies
  - Modules 13 and 14 will explore advanced air mobility and space vehicle advancements.



Students will complete assignments within each module that is directly associated with the module topic and referenced from either given sources or from independent research.

### Steps for successful course completion:

- 1. WATCH and READ the resources available to students related to the use of Canvas and participating in courses found at the university. These are invaluable aids and should be watched/reviewed before starting the course.
- 2. Thoroughly READ the course syllabus, understand the structure and the course requirements.
- Completely READ the content of the module titled "Course & Instructor Information." FOLLOW the recommendations for student success and the requirements listed for assignment and discussion submissions.
- 4. REVIEW all of the course content and module sequencing to 'see' the bigger picture and to place the course into context to understand flow and to identify assignment due dates and potential 'challenges' that could impact your progression and timeliness of requirements completion. *Stay ahead of the game, keep the eye on the ball, anticipate your next move or potential hiccups over the term.*
- 5. Through independent study, READ the associated module overview for that week and the given reading assignment.
- 6. COMPLETE the Reading Review (Quiz) within the module by the due date listed. This is a scored progress check for reading comprehension and recall of the subject material. The questions are sources from the textbook reading assignment.
- 7. WATCH each of the videos listed and be able to discuss and answer the questions listed for each during module discussions or assignments. The videos have been included to add to your depth of knowledge that is relevant to that module and to add general interest and current topics relevant to today.
- 8. POST and REPLY to the DISCUSSIONS assigned within each module by the due dates that are given.
- 9. COMPLETE and SUBMIT each course ASSIGNMENT by the due date given. Submitted reports MUST follow the required format and structure given by the instructor. Instructions and samples are given within the Course & Instructor Information module.
- 10. COMPLETE the mid-term and final exams during the scheduled events provided. The tests will NOT be taken at the UVU Testing Center. They will be taken independently by each student.
- 11. ALWAYS contact your instructor if you have any questions. Don't sit in front of your PC in disgust. Ask.

### **Course Requirements and Flow**

The course consists of a standard fare of mixed methods to acquire and retain information and skills learned within the course. All course requirements are rooted in fulfilling the learning objectives of the course. Additional enabling (detailed) objectives are used within the modules to focus learning into bite size chunks. To achieve these learning objectives, students are expected to complete

reading assignments, reading reviews (quizzes), discussions, written assignments, and a final project.

The intent is to establish a knowledge foundation through the reading reference sources followed by a knowledge check via the reading reviews. Discussions will address topics generally and consist of a mix of discovery, application, and expression of findings (maybe a bit of opinion backed by facts) shared within the learning community. Written assignments consist of a deeper knowledge application of the subjects learned so that they become skills the student can use during their professional career. Each week will follow a similar pattern.

The course's capstone assignment is the final project.

It is important to complete the reading assignment and reading review (quiz) prior to attempting to complete the discussions and assignments. The reading assignments establish context and foundational knowledge necessary to achieve sufficient understanding to apply what has been learned to each of the discussions and written assignment.

### Written Report Format Requirements and Tips for Student Success

The course has discussion and written report format requirements that must be followed for a submission to be accepted and to earn the maximum number of points. The structure of the written reports is similar to a business white paper type of format. This format uses a simple outline-type of structure that makes the report easy to organize and draft. It also helps the student ensure the assignment requirements are met and makes the report easier for the reader to scan.

Tips for student success within the course are found in the module titled "<u>STUDENT SUCCESS</u> - <u>REPORT REQUIREMENTS AND TIP SHEETS.</u>

<u>(https://uvu.instructure.com/courses/533797/pages/tip-sheet-written-assignment-instructions-</u> <u>recommendations-for-success)</u>." The Tip Sheet includes valuable experiences and lessons learned to help the student stay organized, informed, on task, and on schedule. Students are required to review the provided guidance to find the writing format criteria.

A <u>sample of the required report format (https://uvu.instructure.com/courses/533797/files/108340136?</u> <u>wrap=1)</u>  $\downarrow$  (https://uvu.instructure.com/courses/533797/files/108340136/download?download\_frd=1)

 $(\hat{\mathbf{t}})$  is also available for review within this module.

### **Student Responsibilities:**

- Start class the first week of the term.
- Be accountable by setting aside regular time each week to complete course activities and assignments on time as noted per the due dates.
- Learn how to use Canvas including communication tools (e.g. discussion, Canvas inbox, etc.). If you have technology-related problems contact the <u>Service Desk</u> ⇒
   (<u>https://www.uvu.edu/servicedesk</u>).





• Contact your instructor as early as possible if an emergency arises. Do NOT wait until the last minute to ask for an extension.

## Instructor Responsibilities:

- Respond to emails within ONE business day. If multiple emails are received regarding the same question or concern, they may be responded to with an announcement to the entire class.
- Provide timely, meaningful and constructive feedback on assignments.
- Facilitate an effective learning experience.
- Refer students to appropriate services for issues that are non-course content specific. For instance, technical issue, writing labs, accessibility services, etc.
- Mentor students through the course.

# Artificial Intelligence (AI) Expectations and Requirements

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

<u>(https://www.uvu.edu/catalog/current/policies-requirements/student-code-of-conduct.html)</u>, UVU Policy <u>541</u> ⇒ <u>(https://policy.uvu.edu/getDisplayFile/5bedd0ef7b23736d542192e3)</u>.

# I Grading and Late Work Statement

# Grading Scale:

The following grading standards will be used in this class:

Grade	Percent
А	94-100
A-	90-93



Grade	Percent	
B+	87-89	
В	83-86	
B-	80-82	
C+	77-79	
С	73-76	
C-	70-72	
D+	67-69	
D	63-66	
D-	60-62	
E	0-59	

# **Assignment Categories**

Activity	Weighted Value (%)
Module Assignments	20
Final Written Report	50
Final Presentation	30



Activity	Weighted Value (%)
Total	100

## Late Work Statement:

• No late work will be accepted. PLEASE NOTE: All assignments/quizzes must be completed by 11:59 PM MST/MDT (Mountain) on the date listed with the assignment/quiz.

## Learning & Mastery Activities and Assessment Descriptions

Your grade in this course will be determined by your performance on required learning activities and deliverables to include module assignments, a formal written final report and final presentation.

**Note:** This course does <u>not have quizzes</u>, mid-term exam nor a final exam. The final report and presentation represent the final assessment for course outcome achievement per UVU policy.

See individual course modules for specific details regarding assignments, reports, and presentations required by this course.

# Learning & Mastery Activities

### **Assessments:**

Assessments will occur in the form of reading reviews (quizzes), discussion boards, written report assignments, and a final project.

Each assessment includes the grading criteria and total point value for the assignment. Reading reviews that include discrete answers (True/False, Matching, Multiple Choice) are automatically scored via Canvas. The instructor will evaluate each discussion, assignment, and final project using a rubric.

The use of rubrics provides consistency and objectivity in evaluating submission quality and content. Details covering the use and application of rubrics are found in the <u>Student Tip Sheet</u> for Written Assignments (https://uvu.instructure.com/courses/533797/pages/tip-sheet-written-assignment-instructions-recommendations-for-success) in the Student Success in the left hand navigation. It is very important that students in this course carefully review and understand the expectations and requirements of all assignments and how the rubrics will be used to assess the quality of the submission content. Students are responsible for making sure that submissions meet the requirements outlined in the instructions of each discussion, assignment, or final project.



There is no final exam for this course. The requirement for a final course assessment, as defined by UVU Policy 601, is fulfilled by the course <u>final project.</u>

## Reading Reviews (Quizzes)

Reading reviews (quizzes) will be used as progress checks to assess achievement of specific lesson objectives and course outcomes related to the reading assignments. These will include multiple choice, true/false and essay question formats. They are designed to help you retain and apply foundational knowledge and skills. A video on how to complete Quizzes in Canvas can be found in <u>the Canvas Student Guide</u> (https://mediafiles.uvu.edu/common/student\_guide/index\_url.html?page=page1). Note: If the

(<u>https://mediafiles.uvu.edu/common/student\_guide/index\_url.html?page=page1)</u>. Note: If the URL link does not work, please inform the instructor. You will not lose points for quiz questions that are associated with broken URL links.

## Assignments:

The course will include a series of assignments within most modules. Not all modules will include a written assignment. The assignment will consist of a case study, scenario, or a series of questions relevant to either the module's reading assignment or the reference sources provided. The additional reference sources are usually directly linked to web-sourced, industry specific, information sources. The submission requirement for each assignment is a written report. The report format criteria is given in the "Student Success - Report Requirements & Tips Sheets (https://uvu.instructure.com/courses/533797/modules/1278526)."

Assignments are used to deepen your understanding and enhance the skills associated with each module's learning objectives. This is accomplished by applying the knowledge and practicing the processes learned. You will develop critical thinking skills and improve your skills associated with research and report writing and presentation creation and delivery.

Assignment topics are listed in each module (if included). You can also find them under the "Assignments" menu, located in the left column of the Canvas page.

It will be to your advantage to review the assignment well before the week it is due. The assignments are spaced to help you pace yourself throughout the semester. Instructions and grading rubrics are found in the assignment descriptions in Canvas.

### **Discussions:**

Discussions will be opportunities to explore topics together. Posts to the discussion should add significantly to the conversation and support your point of view. *Comments that do not add significantly to a discussion will receive no credit. It is okay to disagree in a discussion. In fact much learning happens when we disagree. However we need to be respectful and keep our online classroom a safe place to learn.* 



Due dates for discussions correspond with the initial post date which is usually a **Thursday**. Follow up comments are due by Sunday. Follow up posts are expected to be after the due date and are not marked late. Discussions conclude by the **Sunday** following the due date. After this, posts will be marked late.

## **Final Project**

This course includes a final project. It will consist of a formal written report that includes a summary of your student journal entry for each learning module. The final report will also include discussions related to questions that you will explore based on your course experience and journal entries.

Details and requirements for the final project are found within the course modules.

# Course Schedule

See the Course Schedule Canvas page (https://uvu.instructure.com/courses/533797/pages/courseschedule).

## Technology Support Services

For 24/7 technical support contact Instructure's Canvas Support Live Chat <u>(https://cases.canvasIms.com/liveagentchat?chattype=student&sfid=001A00000085cNxIAI)</u>

2(385) 204-4930 (Available 24/7)

# UVU Policies and Resources

### Americans with Disabilities Act and Section 504 of the Rehabilitation Act

The Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act of 1973, as amended, prohibit Utah Valley University from engaging in discrimination on the basis of disability in any program or activity. Discrimination is also prohibited in all aspects of employment against persons with disabilities who, with reasonable accommodation, can perform the essential functions of a job.

Students who believe they have been denied program access or otherwise discriminated against because of a disability are encouraged to initiate a grievance by contacting the Accessibility Services Director, Sherry Page at 801-863-8747. Employees can contact the ADA Coordinator, Irene Whittee at 801-863-8389.

Upon request, this information is available in alternative formats, such as mp3, Braille, or large print. To request this format, email **asd@uvu.edu (mailto:asd@uvu.edu)**.

### Accessibility Services Statement

Students needing accommodations due to a disability, including temporary and pregnancy accommodations, should contact Accessibility Services at <u>accessibilityservices@uvu.edu</u> (<u>mailto:accessibilityservices@uvu.edu</u>) or 801-863-8747 located in LC 312. To request ASL interpreters, please contact Katie Palmer at <u>katiep@uvu.edu (mailto:katiep@uvu.edu)</u>

### Accessibility Services Student Information (https://www.uvu.edu/accessibility-services/)

### The following files are not accessible to screen readers –

- (PHAK) Pilot's Handbook of Aeronautical Knowledge. FAA-H-8083-25B
- (AMT-AF-V1) Aviation Maintenance Technician Handbook Airframe, Volume 1. FAA-H-8083-31A
- (AMT-AF-V2) Aviation Maintenance Technician Handbook Airframe, Volume 2. FAA-H-8083-31A
- (AMT-P-V1) Aviation Maintenance Technician Handbook Powerplant, Volume 1. FAA-H-8083-32A
- (AMT-P-V2) Aviation Maintenance Technician Handbook Powerplant, Volume 2. FAA-H-8083-32A
- (HF) Helicopter Flying Handbook. FAA-H-8083-21B

# If you need accommodations for this file, please contact your instructor. If you need additional accommodations, please contact the <u>Office of Accessibility Services</u> (<u>https://www.uvu.edu/accessibility-services/</u>) (801) 863-8747

## **Religious Accommodations Syllabus Statement**

UVU values and acknowledges a wide range of faiths and religions as part of our student body, and as such provides accommodations for students. Religious belief includes the student's faith or conscience as well as the student's participation in an organized activity conducted under the auspices of the student's religious tradition or religious organization. The accommodations include reasonable student absences from scheduled examinations or academic requirements if they create an undue hardship for sincerely held religious beliefs. For this to occur, the student must provide a written notice to the instructor of the course for which the student seeks said accommodation prior to the event.

The UVU campus has <u>a place for meditation, prayer, reflection, or other forms of individual</u> <u>religious expression</u> ⇒ (<u>https://www.uvu.edu/interfaith/reflectioncenter/index.html</u>)\_ as is described on their website.



## **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** (https://policy.uvu.edu/getDisplayFile/5bedd0ef7b23736d542192e3). 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 <u>UVU Policy 541: Student</u> <u>Code of Conduct</u> (https://policy.uvu.edu/getDisplayFile/5bedd0ef7b23736d542192e3).

#### **Definitions and Examples:**

Academic Integrity	
Cheating	
Plagiarism	
Fabrication	

We would like to acknowledge the following institutions: Northeastern University, University of Jamestown, Washington University in St. Louis, and UVU's Woodbury School of Business. This statement uses or adapts parts of their academic integrity statements or used them for inspiration.

Additional information and examples of these policies, can be found in <u>the UVU Catalog here</u> (<u>http://www.uvu.edu/catalog/current/policies-requirements/index.full.pdf</u>).

Title IX Syllabus Statement:

Title IX makes it clear that violence and harassment based on sex and gender (which includes orientation and gender identity/expression) is a civil rights offense subject to the same kinds of



accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has experienced or experiences harassment or sexual assault including, dating and domestic violence, stalking or sexual exploitation, you are encouraged to report it to the Title IX Coordinator in the Office for Equal Opportunity and Affirmative Action, BA-203, (801) 863-7999. Please be aware that all faculty members and university employees are considered "Responsible Employees" and are required to report incidents of sexual misconduct and relationship violence and thus cannot guarantee confidentiality. Please know that you can seek confidential resources at UVU Student Health Services, SC-221, (801) 863-8876.

Please visit <u>https://www.uvu.edu/equityandtitleix</u>  $\Rightarrow$  (<u>https://www.uvu.edu/equityandtitleix</u>) for more information.

 Policies and Success Strategies ⇒ (https://www.uvu.edu/otl/students/policiesandprocedures.html)

 Campus Resources ⇒ (https://www.uvu.edu/otl/students/campus\_resources.html)

 UVU Academic Tutoring ⇒ (https://www.uvu.edu/academictutoring)

 UVU Aviation Sciences Writing Standards ⇒ (https://www.uvu.edu/aviation/student-resources/writing-standards.php)

### **Student Resources:**

- <u>(https://www.uvu.edu/uc/tutoring.html) Student Services</u>
   <u>(https://www.uvu.edu/catalog/current/policies-requirements/student-services.html)</u>
- Current Student Resources (https://www.uvu.edu/students)
- <u>Student Success and Retention departments and programs</u> 
   <u>(https://www.uvu.edu/catalog/current/policies-requirements/student-code-of-conduct.html)</u>
- Student Health Center (https://www.uvu.edu/studenthealth)
- <u>Campus Resources</u> 
   <u>(https://www.uvu.edu/otl/students/campus\_resources.html)</u>
- <u>UVU Academic Tutoring</u> ⇒ (<u>https://www.uvu.edu/academictutoring</u>)

# 5 Student Grievances:

Student Grievances (Student Conduct and Conflict Resolution) (https://www.uvu.edu/studentconduct)

Computer use:



- The minimum computer specifications for Canvas <u>can be found here</u> (<u>https://community.canvasIms.com/docs/DOC-2059</u>). In addition, web browser compatibility <u>can be</u> <u>found here</u> (<u>https://community.canvasIms.com/docs/DOC-1284</u>)</u>. Internet browsers such as Google Chrome or Firefox are preferred. *Note: Apple associated internet browsers such as Safari do not offer a stable platform for Canvas. Use of Safari will limit your accessibility to Canvas resources and can prevent the submission of assignments.*
- You must submit assignments using the approved file format as listed within the assignment. In most cases, this will be any Microsoft Office 365 file format for Word, Excel, PowerPoint, etc.

## **Course policies:**

### <u>General</u>

Withdraw from the Course If you have any questions about withdrawing from the course, please contact your academic advisor. Students registered outside the state of Utah should contact the student support center at 801-863-7830 or 888-901-7192.

Students in the state of Utah should contact **Dianna Bunker** (mailto:Dianna.Bunker@uvu.edu) (last names beginning with A-K) at 801-863-7851 or **Marilyn Riddle** (mailto:RIDDLEMR@uvu.edu) (last names beginning with L-Z) at 801-863-7852.

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