

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

SPST201

Course Summary

Course : SPST201 **Title :** Introduction to Space
Flight Length of Course : 8 **Faculty :**
Prerequisites : SPST200 **Credit Hours :** 3

Description

Course Description:

Students in this course assess the major aspects of space flight. The course covers space flight from early rocketry through the development of satellite navigation, meteorology, and telecommunications, up to human space flight. Course topics also include: rocket propulsion, basic orbital mechanics, the space environment, living and working in space, and an overview of non-U.S. space programs. Instruction is primarily through readings, along with weekly discussions. There will be weekly quizzes, and a paper. (Prerequisite: SPST200)

Course Scope:

Objectives

Upon completion of this course, the student will be able to:

- CO-1: Discuss the unique advantages of the space environment
- CO-2: Describe the elements of a space mission
- CO-3: Analyze the history and science behind the space environment and space activities
- CO-4: Examine the history of rocketry and how a spacecraft is launched into space
- CO-5: Describe the hazards of the space environment
- CO-6: Analyze Newton's and Kepler's Laws
- CO-7: Predict the orbit of a spacecraft through the six orbital elements
- CO-8: Examine how spacecraft maneuver from one orbital plane to another
- CO-9: Describe the key elements and subsystems of a spacecraft
- CO-10: Discuss the basic elements of a propulsion system and their characteristics
- CO-11: Examine the elements of space operations

Outline

Week 1: Space in Our Lives

Learning Outcomes

- Analyze the history of rocketry and spaceflight
- Describe concepts of rocket theory and different methods of propulsion

Required Readings

Understanding Space

Chapter 1: Space in Our Lives

Assignments

Discussion 1 - Introduction

Discussion 2 - Space Mission with the Greatest Impact

Quiz #1

Submit a topic for your research paper for the instructor's approval

Recommended Optional Reading

Video - NASA Future Discussion: How Commercial Space Benefits the U.S.

Recommended Media

Video: Space and its Benefits for Everyday Life

Video: Benefits for Humanity: Space is Our Business

Week 2: Exploring Space and the Space Environment

Learning Outcomes

- Describe how early space explorers used their eyes and minds to explore space and contribute to our understanding of it
 - Explain the beginnings of the Space Age and the significant events that have led to our current capabilities in space
 - Describe emerging space trends, to include the growing commercialization of space
 - Explain where space begins and describe our place in the universe
 - Analyze the space environment and its effects on space activities
 - List the major hazards of the space environment and describe their effects on spacecraft
- List and describe the major hazards of the space environment that pose a problem for humans living and working in space

Required Readings

Understanding Space

Chapter 2: Exploring Space

Chapter 3: The Space Environment

Assignments

Discussion 2 - Hazards of Space Travel

Quiz #2

Recommended Optional Reading

Recommended Media

Video: Sea and Space Exploration: Natural History, Technology, the Environment

Video: 5 Unique Aspects of the Space Environment

Week 3: Understanding and Describing Orbits

Learning Outcomes

- Explain the basic concepts of orbital motion and how they are analyzed
- Determine classic orbital elements given the position and velocity of a spacecraft at a point in its orbit

Required Readings

Understanding Space

Chapter 4: Understanding Orbits

Chapter 5: Describing Orbits

Article: Reassessing Space

Assignments

Discussion 3 – Orbital Motion

Quiz #3

Submit an outline of your research paper

Recommended Optional Reading

Recommended Media

Video: Understanding Kepler's 3 Laws and Orbits

Video: Satellite Constellation Movie

Video: Physical Science 10.1d - Brahe and Kepler

Video: Physical Science 2.7d - Newton

Week 4: Maneuvering in Space and Getting into Orbit

Learning Outcomes

- Explain how spacecraft transfer between two orbits and the velocity change required
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Describe launch windows and how they constrain when spacecraft can be launched into a particular orbit

Required Readings

Understanding Space

Chapter 6 – Maneuvering in Space

Chapter 9 – Getting to Orbit

Article: Six-impulse maneuvers for rendezvous of spacecraft in near-circular noncoplanar orbits

Assignments

Discussion 4 – Space Station Needs Assistance

Quiz #4

Recommended Optional Reading

Recommended Media

Video: 10 Amazing Facts About Gravity

Week 5: Space Systems Engineering

Learning Outcomes

- Describe how payload requirements drive the rest of the spacecraft design
- Identify the major spacecraft subsystems and their associated performance budgets
- Identify the elements of a remote-sensing system
- Describe and compute important parameters of electromagnetic radiation
- Identify and describe the use of Wien's Law and the Stefan-Boltzmann equation to analyze an object's temperature versus the wavelength of its emitted radiation
- Identify the two types of remote-sensing payloads and describe their basic functions

Required Readings

Understanding Space

Chapter 11 - Space Systems Engineering

Assignments

Discussion - Spacecraft Design 101

Quiz #5

Recommended Optional Reading

Recommended Media

Video: Spacecraft Systems Engineering Intro Class Part 3: Robotic Space Missions I

Video: Requirements Basics- Space Systems Engineering 101 w/ NASA

Week 6: Space Vehicle Control Systems and Spacecraft Subsystems

Learning Outcomes

- Describe the elements of and uses for control systems
- Explain the elements of space vehicle attitude determination and control subsystems and describe various technologies currently in use
- Explain the elements of space vehicle navigation, guidance, and control subsystems and how they work together to deliver a vehicle to a desired orbit in space
- Describe the main functions and requirements of the communication and data-handling subsystem (CDHS)
- Describe the main functions and requirements of the electrical power subsystem (EPS)
- Describe the main functions and requirements of the environmental control and life-support subsystem (ECLSS)
- Describe the main functions and requirements of spacecraft structures and mechanisms

Required Readings

Understanding Space

Chapter 12 - Spacecraft Vehicle Control Subsystems

Article: Control-oriented modelling and simulation of spacecraft attitude and orbit dynamics.

Assignments

Discussion - Educational Goals and Peer Review of Draft Research Papers

Quiz #6

Submit a 5-8 page draft of your research paper for peer review

Recommended Optional Reading

Article: Interdependent multi-layer networks: modeling and survivability analysis with applications to spacebased networks.

Recommended Media

Video: Subsystems of a Spacecraft : Engineering Homework Help by Classof1.com

Video: Lecture 16: Guidance, Navigation and Control

Week 7: Rockets and Launch Vehicles

Learning Outcomes

- Explain some of the basic principles of rocket science
- Discuss the various types of rocket systems and their operating principles
- Describe launch-vehicles subsystems and their key design issues
- Discuss the principles of rocket staging and how to determine the velocity change from a staged launch vehicle

Required Readings

Understanding Space

Chapter 14 - Rockets and Launch Vehicles

Article: Big and Simple

Assignments

Discussion Topic: It Really is Rocket Science

Quiz #7

Recommended Optional Reading

Article: Keeping Competitive

Recommended Media

Elon Musk Talks About Propulsion to Space

Week 8: Space Operations

Learning Outcomes

- Describe the major functions of space operations systems
- Identify the main parts of a space mission's communication network
- Explain basic communication principles and determine key parameters of system design
- Describe key tasks performed by teams throughout the mission lifetime
- Explain the advantages of spacecraft autonomy

Required Readings

Understanding Space

Chapter 15: Space Operations

Assignments

Discussion Topic: Your Choice of Topic and Final Thoughts

Quiz #8

Space Mission Project - Presentation

Space Mission Project - Paper

Recommended Optional Reading

Recommended Media

Video: Reassessing Space

Evaluation

Grading:

Name	Grade %
Discussions	40.00 %

Week 1: Space Mission with the Greatest Impact	5.00 %
Week 2: Hazards of Space Travel	5.00 %
Week 3: Orbital Motion	5.00 %
Week 4: Space Station Needs Assistance	5.00 %
Week 5: Spacecraft Design 101	5.00 %
Week 6: Educational Goals and Peer Review of Classmates' Draft Outline	5.00 %
Week 7: It Really is Rocket Science	5.00 %
Week 8: Your Choice of Topic & Final Thoughts	5.00 %

Space Mission Project	20.00 %
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WK8: Space Mission Project (Presentation)	5.00 %
WK8: Space Mission Project (Paper)	15.00 %

Quizzes	40.00 %
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Quiz 8	5.00 %
Quiz 7	5.00 %
Quiz 1	5.00 %
Quiz 2	5.00 %
Quiz 3	5.00 %
Quiz 4	5.00 %
Quiz 5	5.00 %
Quiz 6	5.00 %

Materials

Book Title: Understanding Space - the VitalSource e-book is provided inside the classroom **Author:** Sellers

Publication Info: VS-McGraw-Hill

ISBN: 9780073407753

Book Title: Various resources from the APUS Library & the Open Web are used. Please visit [eReserve](#) to locate the course. **Author:** No Author Specified

Publication Info:

ISBN: N/A

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- [Tutor.com](#) offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- The University encourages all work to be completed according to the course schedule. The University Late Work Policy can be found in the Student Handbook [here](#).

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Discussion

- Discussions are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the discussion. The purpose of the discussions is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

Identity Verification & Live Proctoring

- Faculty may require students to provide proof of identity when submitting assignments or completing assessments in this course. Verification may be in the form of a photograph and/or video of the student's face together with a valid photo ID, depending on the assignment format.
- Faculty may require live proctoring when completing assessments in this course. Proctoring may include identity verification and continuous monitoring of the student by webcam and microphone during testing.

University Policies

[Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

The mission of American Public University System is to provide high quality higher education with emphasis on educating the nation's military and public service communities by offering respected, relevant, accessible, affordable, and student-focused online programs that prepare students for service and leadership in a diverse, global society.