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# **Bachelor of Science in Aerospace Studies Student Learning Assessment Plan**

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Year: 2005**

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## **Program Profile**

Number of full-time faculty: 2 – Dr. Pat Ford and Prof. Katie Berryhill

Number of adjunct faculty: 4 – Dr. Jerry Gideon, Professors Shaine Thrower, Sherri Mitchell, and Rob Kilgo.

118 currently enrolled students up from 95 at the beginning of the year.

## **Bachelors of Science in Aerospace Studies**

The Aerospace Studies program is a unique blend of the study of aeronautical and space science, management, operations, economy, and security. Students in this program have the opportunity to concentrate their efforts in the study of air and air transportation systems and operations; outer space and its planetary, spacecraft, and exploratory issues; or air and space and their associated national security issues and implications.

## **Bachelor of Science in Aerospace Studies Learning Outcomes**

In addition to the institutional student learning outcomes, the Bachelor of Science in Aerospace Studies also seeks the following specific learning outcomes of its graduates. With reference to each of the respective areas of Aerospace Studies, graduates in this degree program will be able to:

### *Research and Analysis*

- Conduct fundamental quantitative and qualitative research related to aerospace systems and theory.
- Analyze the principles of manned and unmanned flight, both within and outside of the Earth's atmosphere.

### *Scientific Investigation*

- Calculate and apply basic laws of planetary motion and gravitation, including two-body mechanics.
- Apply the basic laws of aerodynamic force and discuss how they apply to both fixed and rotary wing aircraft.
- Describe rocket fundamentals including propellants, combustion principles and general components.

### *National and International Security*

- Assess the institutions of both aviation and space law and determine how these institutions affect applications such as commercial and private aviation, satellite sales, and arms control.
- Describe the role(s) of key aerospace organizations in the United States.
- Evaluate the political and commercial significance of major national and international aerospace endeavors, including past, current and planned.
- Discuss the history of modern aviation, including the key events and individuals that impacted overall aerospace development.
- Analyze the advantages and disadvantages of aerospace systems in modern warfare, including manned and unmanned aerial vehicles, as well as space-based platforms.

## Curricular Mapping

Institutional Student Learning Outcomes	Core & Required Courses	Narrative Comments
<p><b>Academic Skill</b>            Graduates of APUS will possess academic skill related to their specific discipline. The graduate will master the generally accepted theories, concepts, principles, and/or practices associated with their discipline.</p>	<p>IR377 , IR395, IR475, IR476, IR477, MC488, SC301, SC396, SC478, EN380, IR483, IR484, IR485, IR486</p>	<p>Courses provide the student with the research skills and the opportunity to demonstrate theories, concepts, principles, and/or practices associated within the discipline (e.g., IR475 provides the intellectual foundation to understand the relationship between the government and private sectors of the U.S. space organization).</p>
<p><b>Communication</b>            Graduates of APUS will be able to clearly communicate ideas in written form.</p>	<p>IR377, IR395, IR475, IR476, IR477, MC488, SC301, SC396, SC478, EN380, IR483, IR484, IR485, IR486</p>	<p>Courses provide student various assignments that enhance communication skill sets (e.g., IR476 - History of Space utilizes writing assignments and exams that require the student to draw conclusions from the text, outside reading, and discussions).</p>
<p><b>Critical Thinking</b>            Graduates of APUS will be able to analytically identify issues with the ability to evaluate problems, formulate solutions, and evaluate the consequences. Graduates will be able to express a variety of other viewpoints and methods of inquiry.</p>	<p>SC101, MA225, SC103, SC104, SC107, IR476, IR377, IR475</p>	<p>All Aerospace Studies courses require students in newsgroups to develop and support particular ideas, state their analyses, and defend them to both their classmates and professor (e.g., IR476 requires the student to demonstrate the ability to identify a problem, analyze a historical event, and formulate a solution that applies to the 21<sup>st</sup> century; in IR377, students read accident investigations from the Challenger and Columbia disasters. In newsgroup discussions, they analyze the effect of those disasters on NASA and U.S. human space flight; IR475 - National Space Organization - provides students with the analytical tools to comprehend and explain its exploration program, satellite operations, military purposes, and research and development).</p>
<p><b>Information Literacy</b>            Graduates of APUS will be technologically proficient in accessing and using information. The graduate will be able to gather information from a variety of sources, use information in an appropriate manner to address issues and take action.</p>	<p>IR377, MC488</p>	<p>Course syllabi and classroom software platform introduce students to numerous opportunities to access information from web-based research sites.</p> <p>Professors require that students visit discipline related web sites (e.g., IR377 students are required to visit NASA’s Jet Propulsion Laboratory’s Basics of Spaceflight web page; in MC488, students are required to conduct</p>

		Internet based research to find information on particular economic sectors).
<b>Lifelong Learning</b> Graduates of APUS will have the ability to identify, pursue and acquire specific and new knowledge after the end of formal schooling. They will be able to apply this knowledge in real world settings.	IR377 , IR395, IR475, IR476, IR477, MC488, SC301, SC396, SC478, IR483, IR484, IR485, IR486,	By providing students with a highly interactive classroom and promoting academic success with peer-to-peer learning, students will develop a positive attitude to learning and recognize life experiences as learning opportunities.
<b>Aerospace Studies Degree Program Learning Outcomes</b>		
<b>Research and Analysis</b> Conduct fundamental quantitative and qualitative research related to aerospace systems and theory.	IR377, SC401	Both IR377 and SC401 require student to do both quantitative and qualitative research. As a program prerequisite, IR377 includes a writing portion to help students succeed in later courses.
Analyze the principles of manned and unmanned flight, both within and outside of the Earth's atmosphere.	IR377, IR477, IR484, IR486, SC301, SC478	Each of these courses covers space flight and builds on the premier course in the learning outcome, SC478 Orbital Mechanics.
<b>Scientific Investigation</b> Calculate and apply basic laws of planetary motion and gravitation, including two-body mechanics.	IR377, IR484, SC478	IR377 introduces but does not calculate and apply basic laws. IR484 and SC468 cover those in detail.
Apply the basic laws of aerodynamic force and discuss how they apply to both fixed and rotary wing aircraft.	SC301	SC301 is the Principles of Aeronautical Science.
Describe rocket fundamentals including propellants, combustion principles and general components.	SC478, IR377, IR477, IR478, IR486, SC478	Each of the noted courses delves into the learning outcome and how it contributes to the overall field.
<b>National and International Security</b> Assess the institutions of both aviation and space law and determine how these institutions affect applications such as commercial and private aviation, satellite sales, and arms control.	IR395	Space Law is a core course because of the necessity of understanding the constraints and limitations place on commercial and private efforts.
Describe the role(s) of key aerospace organizations in the United States.	IR395, IR475	IR395 covers the commercial and private organizations while IR475 covers the US and

		international governmental organizations, with distinctions noted in countries that combine the two spheres.
Evaluate the political and commercial significance of major national and international aerospace endeavors, including past, current and planned.	IR475, IR486, MC488	IR475 and IR486 consider the political aspects while IR486 and MC488 cover the commercial aspects.
Discuss the history of modern aviation, including the key events and individuals that impacted overall aerospace development.	SC301	Relating the history in any field of study is important to understanding current developments.
Analyze the advantages and disadvantages of aerospace systems in modern warfare, including manned and unmanned aerial vehicles, as well as space-based platforms.	IR377, IR484, IR486, SC301	Each of the noted courses delves into the learning outcome and how it contributes to the overall field.

**Student Learning Assessment Plan**  
**Bachelor of Science in Aerospace Studies**  
**Reporting Period: 2005**

<b>Course Level Assessment</b>	<b>Use of Assessment Information for Continuous Improvement</b>
<p>In IR475, weekly newsgroup postings require the student to either answer a question or comment on weekly assignments.</p>	<p>Professor assesses if the student has met the weekly course objectives. If course objectives have not been met, additional questions are posed to the student and additional instruction is reinforced.</p>
<p>Professor Graham sets up chat sessions once every three weeks within a 16-week class to assist in determining student's comprehension level. During the chat session, the professor introduces problems, discussion questions, and exercises related to the course.</p>	<p>Based on feedback from the student, the professor determines the breadth of student comprehension of the material. Students who are identified as needing extra help are sent an additional email and offered help by the professor if needed.</p>
<p>Professor Thrower has recently revised course assignments to include weekly newsgroup postings where students are required to summarize that week's reading.</p>	<p>Professor reads newsgroup summaries to gain a better understanding of the student's interpretation of the readings, and then responds either with a newsgroup reply or a personal e-mail.</p>
<p>Professor Graham initiates a live chat session where he encourages a debate among his students. Students are sent a preparatory message to set up the debate topic. In the preparatory message, he selects students to be on the "Pros" side or the "Cons" side. In the live chat session, students actively rebut each other during the debate.</p>	<p>Based on the nature of the debate and student's comprehension of the subject matter, additional discussion questions are posed.</p>
<p>Students are required to do research papers in all upper-level courses.</p>	<p>Professor Berryhill is in the process of developing a multimedia tutorial to introduce students to research and writing in the first space studies course. This tutorial will help prepare them for writing assignments in upper-level courses.</p> <p>To assist students with their upper-level writing requirements, a research and writing guide has been developed for IR395, IR477, IR496, and MC488. The writing guide includes information on: 1) specific course writing standards, 2) choosing a research topic, 3) writing/editing, 4) citation/reference, and 5) bibliography standards. See link below for more information”</p> <p><a href="http://homepage.mac.com/katieberryhill/apus/writing_guide.ntweb/">http://homepage.mac.com/katieberryhill/apus/writing_guide.ntweb/</a></p>
<b>Degree Program Level Assessment</b>	
<p>Extraneous concentrations eliminated in 2005 to allow students to focus on the critical courses in the field of study.</p>	<p>See CURCOM minutes</p>

Curriculum changes as a result of vetting by the entire faculty for their relevance to the field.	EN380 was eliminated as a major course from BA Aerospace Studies. Three space studies courses added – Space and Weapons, Space Weather, History & Anatomy
Review of Aerospace Studies program by department chair and faculty – goal is to reduce the multitude of offerings available to students.	When the undergraduate Aerospace Studies courses split from the International Relations courses, students in the program needed an independent study option. Space Studies independent studies course was added to the curriculum.
Advisory group formed by Space Studies faculty to examine Aerospace Studies curriculum. Math and science requirements were examined to ensure that students have adequate preparation for upper level courses.	General Education specifications were made in an effort to give greater clarity to the Aerospace Studies program and to adequately prepare students for the program. Science – 8 semester hours – SC103 – Introduction to Physics; SC104 – Introduction to Astronomy; Mathematics – MA111 – College Algebra and Trigonometry
<b>Additional Measures of Assessment</b>	
Faculty and department chairs are required to fill out a faculty evaluation worksheet to review the content of their syllabi, use of Educator tools, conduct within the classroom, and best practices.	Department chairs follow up on the faculty evaluation sheet if there are deficiencies in the course, syllabus, and/or teaching practices. Results show that Faculty are not using rubrics for writing assignments and newsgroups are not being used effectively to promote peer-to-peer learning.
Review of student testimonials	Student testimonials are distributed among Faculty and Department Chairs. Department Chairs encourage Faculty to follow up with testimonials, taking appropriate course and degree program level actions.
Review of Aerospace Studies Course Objectives by LOA Director using objectives checklist	Aerospace Studies Faculty are required to go through a course objectives review process. Course objectives were reviewed, and refined if necessary, to ensure alignment with degree program outcomes and best practices.
Review of Aerospace Studies Program by Provost	<i>Best Practices in Online Learning</i> workshop was created by the Director of Faculty Development to encourage the use of best practices in online teaching and learning. All Aerospace Studies professors were required to engage in the workshop and convert their old student course guide into a standardized syllabus template.
Students are prompted to take an end of course survey that inquires about student about course instruction, instructor effectiveness, and classroom technology.	Faculty are sent follow up reports and asked, “What modifications have you made to this course as a result of the end of course survey results?” Summary information is shared with Deans and Department Chairs. Corrective action and trends are evaluated.
Students are required to take an end-of-program survey.	Data are shared regularly with Student and Academic services to inform decisions at those levels.
Employers are surveyed on student’s proficiency in APUS’ institutional outcomes.	Data are shared regularly with Student and Academic Services to inform decisions at those levels.