

Aviation Sustainability Education via Law and Policy Courses

Trevor Simoneau, Embry–Riddle Aeronautical University, Daytona Beach

Trevor is an instructor in the Department of Aeronautical Science at Embry-Riddle Aeronautical University, where he also serves as a research associate at Embry-Riddle's Boeing Center for Aviation and Aerospace Safety. His academic work focuses on aviation legislation, regulation, and flight safety topics. He studies and writes about the relationship between aviation safety and the law, often in the context of governing new aviation technologies. He earned a master's degree in aviation, with distinction, and a bachelor's degree in aeronautics, summa cum laude, from Embry-Riddle Aeronautical University.

Dr. Tyler Spence, Oklahoma State University

Tyler Spence is an Assistant Professor within the aviation program in the College of Education at Oklahoma State University. Dr. Spence earned his PhD in Aviation Technology from Purdue University with concentration in aviation policy issues and political science. He has a specialized interest in international aviation development and sustainable transportation policy issues that combine political science, policy studies, and aviation.

Dr. Shantanu Gupta, Bowling Green State University

Shantanu Gupta is an Assistant Professor at the Bowling Green State University in the School of Aviation within the College of Technology, Architecture, and Applied Engineering. Dr. Gupta earned a B.E in Mechanical Engineering from Visvesvaraya Technological University, India, a M.S in Aviation and Aerospace Management from Purdue University, and a Ph.D. in Technology from Purdue University, West Lafayette. His research interests include aviation data analytics, AI/ML applications in aviation, and aviation business, finance, sustainability, and education.

Aviation Sustainability Education via Law and Policy Courses

Introduction

The aviation industry is encountering rapid sustainability and environmental policy transformation. Companies from all corners of industry are working to develop eco-friendly technology while branding sustainability and environmental initiatives as vital goals for the next decade, for example [1], [2], [3]. These moves are, in part, a vital component of the industry's overall shift towards improved sustainable operations. As a result, questions about how to improve aviation's sustainability regulatory framework and overall green output have moved to the forefront of industry conversations worldwide at the academic, commercial, and government levels. There is little dispute that the next several decades will likely bring about revolutionary changes in aviation technology and, consequently, aviation operations as sustainability increasingly moves into the spotlight. These changes will also foster regulatory conflicts and policy challenges for the Federal Aviation Administration (FAA), European Union Aviation Safety Agency (EASA), International Civil Aviation Organization (ICAO), and other civil aviation authorities as regulatory questions will increasingly require sustainable answers.

As these regulatory questions are answered, the daily operational structure of the aviation industry could change dramatically. Thus, the roles and responsibilities at nearly all levels of employment in the aviation industry will require, at a minimum, foundational knowledge of sustainability topics and their relationship with government involvement, whether through visionary leadership or direct regulatory oversight. This need for foundational sustainability knowledge raises questions about the extent to which current university students in aviation degree programs are prepared to tackle these future responsibilities. Many universities have recognized this burgeoning job requirement and have implemented sustainability focused courses and degree programs. Aviation universities, in particular, are steadily beginning to implement sustainability topics to courses; it is vital to take this step. As Sengupta et al. [4] explained, "the aim of imparting education to understand sustainability is to empower students to make decisions that balances the need to preserve healthy ecosystems and ultimately promote vibrant economies with an equitable social system," which is especially true in the aviation industry. The question, then, becomes how to empower students with this knowledge effectively. We propose that part of the answer may be found through undergraduate aviation law and policy courses.

Accordingly, this paper presents an analysis of existing law and policy courses with topics related to sustainability offered at University Aviation Association (UAA) member institutions. We suggest law and policy courses can serve as an effective vehicle for teaching sustainability topics in aviation degree programs. This paper also provides a rudimentary framework for institutions seeking to integrate an undergraduate sustainability law and/or policy course to their aviation degree program.

Background

Government oversight has long been a cornerstone of civil aviation's development into a successful mode of public transportation. The early 1920s saw the emergence of the first civil aviation regulatory in the U.S. and the U.S. Post Office contracting with commercial airlines to carry the mail via airplane [5]. As the industry grew, government involvement was required to ensure evolving aviation technologies could merge safely with an increasingly busy airspace system. While the term "sustainability" may be a relatively recent concept defining a drive to mitigate harms, in aviation, the role of government has always been to establish commercial aviation as a mode of public transport that is accessible to the mass public while allowing individual companies to thrive for continuing success. The scientifically backed requirement for a shift towards a new vision of sustainable operations in the aviation industry has been repeatedly documented in an array of technical academic publications, media articles, political speeches, and internal company rhetoric. The ICAO Secretary General [6] has explained that "In addition to its work on technological and operational measures, ICAO is now focusing on four key areas to address aviation's greenhouse gas emissions: State action plans; sustainable alternative fuels; Market-based Measure (MBMs); and global aspirational goals to ensure the long-term sustainability of aviation." More broadly, higher education scholars, too, have focused on the importance of sustainability in the curriculum [4] [7].

However, there has been less discussion about the significance of preparing the incoming generation of aviation professionals to tackle the sustainability related questions and issues they will inevitably encounter. This is especially true in the context of the necessary laws and policies fostered by government leaders to move the industry forward in a way that continues to increase the accessibility of air travel to the public while maintaining a commitment to secure air travel for future generations. There have been even fewer discussions about the techniques and methods being used to equip students with this crucial foundational sustainability knowledge in the aviation education context.

Hamilton [8] has described teaching aviation law courses in aviation degree programs as significant and necessary because "in the face of an increasingly litigious society and intolerant enforcement of administrative regulations, introductory aviation law courses are taking on a new importance to students and prospective aviation industry employers alike" [8]. Further, teaching sustainability topics was emphasized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) [9] in describing how sustainability education "promotes skills like critical thinking, understanding complex systems, imagining future scenarios, and making decisions in a participatory and collaborative way." There is little debate that developing and maintaining all these skills is valuable for aviation professionals. While Seatter and Ceulemans [10] have described sustainability education as "urgent" and "vital," the importance of teaching sustainability at higher education institutions has been stressed by Cortese [11] as "critical" because higher education institutions are where future professionals, those who will one day

influence society's institutions, go to learn. These skills – critical thinking, interpreting complex systems, imagining future scenarios, and making decisions – are all similarly promoted and taught through undergraduate law and policy courses. These courses frequently cover complex issues such as legal interpretations, policy analysis, and understanding economic frameworks, all of which require the skill described by UNESCO.

In aviation, sustainability education encompasses the interaction of social, environmental, operational, and economic factors, as the four pillars of sustainability identified by FAA [12]. Many undergraduate aviation law and policy courses encompass these pillars in their syllabi to an extent. The social pillar is often analyzed through discussions about the way that law interacts with society and how the enactment of policy, or lack thereof, impacts individuals in society. The operational pillar is frequently covered in discussions about FAA rulemaking power, regulatory enforcement power, and the liability of airlines and operators. The economic pillar may be covered through discussions about air commerce, antitrust oversight, and business entities. More importantly, the environmental pillar may be considered through discussions about aircraft noise, aircraft engine emissions, wildlife strikes, land use and zoning issues, or relevant regulations promulgated by the FAA and/or Environmental Protection Agency.

Purpose of the study

By establishing a foundation for students in aviation law and policy courses, institutions have the unique opportunity for aviation career focused students to learn and apply concepts related to the formation of policy, public discourse, regulatory development, the roles played by various levels of government, involvement of industry participants, and impacted or concerned community citizens. These courses can indeed be an excellent venue for teaching fundamental aviation sustainability topics and discussing associated issues. Accordingly, the purpose of this research is to answer the following questions: (1) To what extent are aviation law and policy focused courses being taught in aviation degree programs? (2) What are the common elements required in aviation law and policy courses as indicated by course descriptions? (3) To what extent do aviation law and policy courses have a clear focus on integrating sustainability topics? Through these questions, we also discuss considerations for a sample course devoted specifically to sustainable aviation taught via a law and policy course.

Methodology

The purpose of this simple exploratory analysis was to determine the extent to which universities that offer aviation degree programs are actively incorporating sustainability topics into their respective aviation law and policy courses. We analyzed the course catalogs (as of 2022) of 114 UAA member institutions using descriptive methods and a qualitative analysis approach. Descriptive data were collected and coded based on keywords related to sustainable practices and then tallied. Specifically, the descriptive data collected from the course catalogs of UAA member institutions were the course number, title, and official description of all aviation

law and policy courses at each member institution. Once these courses were identified, the official catalog description was evaluated to determine if it included key terms related to sustainability topics. Examples of such topics include aircraft noise, environmental regulations, and alternative energy technologies.

Results

Our analysis results reveal that a vast majority of UAA member institutions reviewed offer and require an aviation law and/or policy course for students pursuing an aviation degree. However, of the 81 (71%) member institutions that offer such courses, only five (6%) included topics related to sustainability in their course description. Programs that did not offer a specific law and policy course at an aviation-focused institution were largely those that were community colleges or technical institutes with an associate-level degree program. Only three community colleges or technical institutes offered a degree program that included an aviation law course. In addition, 43 of the examined courses mentioned a specific focus on the Federal Aviation Regulations (FAR) and 10 course catalog descriptions specifically mentioned enforcement as a topic in the course. Of those courses, only one course description seemed to include components with a sustainability aspect.

The five aviation law and/or policy courses that expressly include sustainability topics in their course descriptions are offered at Baylor University, Texas A&M University – Central Texas, The Ohio State University, Utah Valley University, and Vaughn College of Aeronautics & Technology. Each course is at least a 300/3000 level course or above, indicating they are courses designed primarily for junior and senior students. The course catalog descriptions, where the sustainability topics are highlighted, are presented in Table 1.

Of these courses, only one, *AVSC 3333: Airports and Environmental Impact* at Texas A&M University – Central Texas, uses the term “sustainability” in its course description. This single course incorporates a broad study of sustainability with an examination of FAA guidance on associated topics. In contrast, *AVSC 4160: Aviation Law* offered at Utah Valley University, met the analysis criteria of incorporating sustainability by expressly stating “the environment” in its course description, but there is little context provided to actually evaluate the extent to which environmental discussions are prevalent throughout the course as its description is very broad and covers many other aspects of aviation law and regulation that suggest a high-level approach to introducing a variety of topics in a relatively short duration of a single semester course. *AVS 4323: The Environment and Economic Analysis* at Baylor University is required for the institution’s *Aviation Science* degree. But while there are sustainability related outcomes described in the catalog description, there is not a specific focus on aviation issues mentioned. In addition, only two of the four pillars of sustainability are described, leaving out a clear discussion of social and operational sustainability impacts.

Table 1: UAA Member Institution Law and/or Policy Courses with Sustainability Topics in Course Description

School	Course	Description
Baylor University	AVS 4323 The Environment and Economic Analysis	Economic analysis in the description, analysis, and policy formulation of environmental problems such as natural resource development, ecology, energy needs, noise, water, and air pollution.
Texas A&M University – Central Texas	AVSC 3333 Airports and Environmental Impact	Review the FAA advisory circular topics such as sustainability, solar alternative energy, environmental hazards and prevention of mishaps with an emphasis on the importance of environmental concerns in modern airports and the impact on the surrounding communities and ecosystems.
The Ohio State University	AVIATN 3200 Aviation Regulations and Policy	Consideration and analysis of aviation regulatory environments and processes, such as regulatory certifications, rulemaking, and legislation. Maintenance, airports, aircraft, and operations. Law, environment, safety, security, and operations.
Utah Valley University	AVSC 4160 Aviation Law	Introduces the student to the United States Constitution plus derivation and application of international, federal, state, and local laws as applied to aviation. Covers administrative, civil, and criminal law including torts, principles of liability, contracts, sales, commercial transactions, the environment, labor law, and Federal Aviation Regulations.
Vaughn College of Aeronautics & Technology	ATM320 Aviation Law	This course concentrates on the functions of federal and local regulatory agencies regarding legislation concerning aviation. Topics discussed include aircraft operation, maintenance, noise, and air pollution. Case studies will provide the foundation for discussions.

A Framework for a Sustainable Aviation Law and Policy Course

Given that a vast majority of UAA member institutions offer and require an aviation law and/or policy course for students, there is a reasonable expectation that a collegiate aviation curriculum should include at least one class with a focus on law, policy, regulation, or some combination thereof. As indicated by the results, five universities have already started integrating sustainability topics into their land and/or policy courses. We propose that universities offering aviation degree programs should do the same. Aviation institutions should consider this approach (or even consider creating a new course devoted specifically to these issues) because these types of courses are widely accessible to students from a myriad of disciplines. This course need not require any specific background knowledge as it ought to be designed to be foundational and introductory in nature. Therefore, engineering, flight, physical sciences, humanities, and business

program students could undertake it alike, thereby expanding the outreach of sustainability topics to multiple degree programs within aviation-focused institutions. Such a course should not be devoted strictly to topics traditionally covered in undergraduate law courses. It must be a balance of law *and* policy topics, emphasizing the important relationship between the two because. As Robertson [13] put it, “all law is about policy,” after all. The goal of the course should be to equip students with foundational sustainable aviation knowledge applicable to their ultimate real-world career goals. To achieve this objective, both law and policy should be the fundamental pillars of the course. Still, developing an aviation law and policy course focused on sustainability topics poses unique challenges for institutions. The following paragraphs outline certain key characteristics that may be included in these types of courses.

Starting with one of the most critical components of the course: title. While the title of the course may initially appear to be an unimportant part of the course framework, it is the first impression students will have of the course. That first impression may ultimately play a significant role in students’ decision to enroll in the course at all. The title should be vibrant, engaging, and intriguing. Simply “Introduction to Sustainability” or “Sustainable Aviation Law and Policy” may not have the same effect on students as “Transforming Aviation Through Sustainable Law and Policy” or “Your Aviation Future: Transformative Sustainable Aviation Laws and Policies.” Since such a course is likely designed for students from varying backgrounds, it is vital that a multidisciplinary approach is used throughout the course. Class sessions should be a blend of lectures, discussions, and debates. Assignments should emphasize conducting research, considering various perspectives, and identifying the cause, effect, and significance of aviation environmental policies. Assessment methods may be left up to the individual instructor but should stress critical thinking skills and application of class discussions. The course may be organized into four main topics: the legislative and regulatory process, fundamentals of environmental law, economic aspects of sustainable initiatives, and integration of sustainable aviation technology. Each topic will be accompanied by associated readings, lectures, class discussions, and debates.

The first topic, *the legislative and regulatory process*, will include a review of the fundamental structure of the U.S. government, discuss the legislative process, and introduce the administrative agency rulemaking process. The formation of environmental public policy will be covered, and the significance of public acceptance highlighted. Discussions will include both the role of the executive branch and of citizens in the rulemaking process, and a study of Title 40 of the Code of Federal Regulations. Specific attention should be focused on the authority of the EPA and class discussions may center around various EPA regulatory enforcement cases. Moreover, the burgeoning role of the FAA in developing sustainable aviation policies should be discussed.

The second topic, *fundamentals of environmental law*, picks up where the first topic leaves off. This topic will begin by introducing students to the U.S. legal system by covering the various sources of law and the U.S. court system. This topic will teach students how to read and analyze statutes and cases, while covering fundamental legal topics such as adjudication, preemption, and aspects of liability. Specifically, the provisions of the National Environmental Policy Act and Clean Air Act germane to the aviation industry should be discussed. Furthermore, the role of airports and the FAA in promulgating environmentally friendly regulations, in conjunction with the EPA, should be addressed.

The third topic, *economic aspects of sustainable initiatives*, should address the ways sustainable technology may foster economic growth without causing environmental harm. The relationship between environmental policies and the economy should be discussed at length. Further, issues such as competitiveness and public perceptions should be addressed from the perspective of the airline industry and aircraft manufacturers.

The fourth and final topic, *integration of sustainable aviation technology*, addresses the challenges facing the FAA with respect to the integration of sustainable aviation technology. The certification of electric aircraft, the use of sustainable aviation fuel, and the current policies aimed at mitigating aircraft emissions should all be covered. Review of airworthiness certification standards, advisory circulars, FAA orders, and scientific studies can all provide guidance for class discussions about this topic. Fundamental scientific and operational principles of sustainable aviation technology could also be addressed, bringing in basic engineering and science fundamentals.

Conclusion

A sustainability-focused perspective will be an important aspect of aviation industry development and policy in the years to come. Incoming aviation professionals must be prepared to manage and build upon this perspective. Thus, institutions offering aviation-focused degree programs for students who seek to become industry leaders should, at a minimum, provide foundational level knowledge about aviation sustainability issues. One effective way of achieving this goal could be through sustainable aviation law and policy courses. Over time, as courses analogous to the proposed framework/outline are implemented in aviation institutions, further research should be conducted to determine the best pedagogical methods for effectively teaching sustainable aviation via a law and policy approach. Additionally, an evaluation of institutions outside of the aviation industry should be completed to discover the sustainability education policies of other industries and identify best practices that may be applied to aviation-focused institutions.

References

- [1] United Airlines, “Our Commitment to Environmental Sustainability,” united.com.
<https://www.united.com/en/us/fly/company/responsibility/our-environmental-commitment.html> (accessed Apr. 28, 2026).
- [2] American Airlines, “Sustainability at American,” news.aa.com.
<https://news.aa.com/sustainability/default.aspx> (accessed Apr. 28, 2026).
- [3] Simon Mainwaring, “How Delta Is Reaching New Heights of Sustainability,” Forbes.com.
<https://www.forbes.com/sites/simonmainwaring/2025/04/29/how-delta-is-reaching-new-heights-of-sustainability/> (accessed Apr. 28, 2026).
- [4] E. Sengupta, P. Blessinger, and T.S. Yamin, “Introduction to integrating sustainability into curriculum,” in *Integrating Sustainable Development into the Curriculum*, E. Sengupta, P. Blessinger, and T.S. Yamin, Eds. Emerald Publishing Limited, 2020, pp. 3-14.
- [5] N. A. Komons, *Bonfires to Beacons: Federal Civil Aviation Policy Under the Air Commerce Act, 1926–1938*. Washington, D.C.: Smithsonian Institution Press, 1977.
- [6] International Civil Aviation Organization, “Global Aviation and Our Sustainability Future: International Civil Aviation Organization Briefing for RIO+20,” [Online]. Available: https://www2023.icao.int/environmental-protection/Documents/Rio+20_booklet.pdf
- [7] J. Moore, “Seven recommendations for creating sustainability education at the university level: A guide for change agents,” *International Journal of Sustainability in Higher Education*, vol. 6, no. 4, pp. 326-339, Dec. 2005.
- [8] J. S. Hamilton, “Teaching aviation law at the undergraduate level: A syllabus,” *Journal of Aviation/Aerospace Education & Research*, vol. 1, pp. 10-15, Fall 1990.
- [9] United Nations Educational, Scientific and Cultural Organization, “UNESCO roadmap for implementing the Global Action Programme on education for sustainable development,” Paris, France, 2014. [Online]. Available: <https://unesdoc.unesco.org/ark:/48223/pf0000230514>
- [10] C. S. Seatter and K. Ceulemans, “Teaching sustainability in higher education: Pedagogical styles that make a difference,” *Canadian Journal of Higher Education*, vol. 47, pp. 47-70, 2017.
- [11] A. Cortese, “The critical role of higher education in creating a sustainable future,” *Planning for Higher Education*, vol. 31, pp. 15-22, 2003.
- [12] Federal Aviation Administration, “Airport Sustainability,” faa.gov.
<https://www.faa.gov/airports/environmental/sustainability>
- [13] H. G. Robertson, *Strategies and Techniques for Teaching Environmental Law*. New York, NY: Wolters Kluwer, 2021.