

Guide to Open Educational Resources (OER) for Aerospace

OER Overview

Open Educational Resources (OER) are freely accessible, openly licensed materials designed for teaching, learning, and research purposes. These resources are often hosted on online platforms and can include textbooks, course modules, lectures, videos, simulations, quizzes, and other educational tools. A significant advantage of OER is their adaptability where instructors and students can customize resource materials to meet their specific needs. This adaptability makes OER highly beneficial for disciplines like aerospace where educational content must frequently reflect the latest advancements in technology and regulation. In aviation, OER can be particularly beneficial as it offers free access to flight training materials and instructional videos that aid in foundational training. These resources are valuable for student pilots who may face financial barriers to traditional training resources. By removing these barriers, aviation OER enables a wider demographic to develop essential skills, thereby promoting inclusivity in aviation training.

OER was introduced to make quality educational resources available to everyone, helping to reduce the cost of education and lower barriers to learning. By removing licensing and access restrictions, OER supports inclusive and equitable access to knowledge and enables educators and learners to explore a wide range of subjects. The openness of OER also aligns with the collaborative nature of aerospace, encouraging knowledge-sharing and advancement in the field. In aerospace, where educational resources can be expensive, OER provides an accessible entry point for learning that enables wider participation in STEM for students at MSU Denver.

Beyond cost savings, OER supports innovative teaching practices. Instructors can integrate OER into their classrooms to offer supplemental content that enhance traditional learning. Since aerospace demands both theoretical knowledge and practical skills, the use of diverse OER formats (e.g., textbooks, video demonstrations, data analysis tools, etc.) can help create a holistic educational experience.

Locating OER

Finding aerospace-specific OER requires identifying platforms that specialize in high-quality, openly licensed STEM content. Many platforms contain a variety of aerospace materials and resources, offering topics ranging from basic to advanced concepts (see list at end of document). Instructors and students can access these resources at no cost, and many are accompanied by [Creative Commons licenses](#). The six Creative Commons licenses allow creators a standardized way to give permission for others to use, share,

and potentially modify their work under specific conditions like attribution (BY), non-commercial use (NC), and restrictions on derivative works (ND; licenses with the ND element are not technically open because the restriction on derivatives). Such licenses promote sharing while also helping creators control how their content is used. This framework encourages sharing and collaboration while protecting the creator's original rights and intentions.

Conducting keyword searches using terms such as 'aerospace,' 'aviation,' 'space technology,' and 'flight training' across OER platforms can help narrow down specific topics within aerospace. As with any content, ensuring accuracy and current relevance is crucial, especially for resources used in aerospace (e.g., flight training). NASA provides a comprehensive repository of open educational materials tailored to aerospace. These resources are aimed at both K-12 and higher education and include lesson plans, data sets, and virtual tours of space technology. NASA's OER platform allows learners to engage with authentic data and materials, which enables a richer learning environment. Additionally, platforms like [MIT OpenCourseWare](#) and [LibreTexts Engineering](#) provide comprehensive course materials for aerospace from industry experts that instructors can modify and incorporate into their own curriculum. For aviation-specific resources, the FAA provides extensive open educational resources, including topics like weather, navigation, and aviation regulations, which are particularly useful for students pursuing certifications.

Evaluating OER

Evaluating OER for quality and relevance is essential for effective educational use. Evaluation is accomplished by considering accuracy, relevancy, and licensing. Assessing the accuracy of the material involves verifying that the content is based on credible sources and includes up-to-date information. It is also important to evaluate if the OER has been created or reviewed by experts in the field. Many OER platforms allow users to view the author's credentials, which can help determine the reliability of the material. Relevance is a key factor in selecting appropriate OER since it is important that the material directly aligns with the course learning objectives or research interests of the instructor. Furthermore, well-organized, clear content enhances usability and comprehension, especially for complex aerospace topics. Licensing is also an essential OER consideration criterion since it dictates how the material can be used and adapted. Confirming that the OER has a license compatible with intended uses (e.g., adaptation or redistribution) is crucial. Many OER materials come with Creative Commons licenses, which specify conditions such as allowing or prohibiting commercial use and whether adaptations are permitted. Reviewing these terms ensures that the resource can be integrated into teaching or learning activities.

Creating OER

Creating OER allows instructors to contribute valuable resources to the broader educational community. The first step in creating OER is identifying a specific need or gap in existing resources. In aerospace, this could be the lack of certain case studies or updated content on new technologies (e.g., virtual reality, etc.). Recognizing these gaps allows instructors to focus on developing resources that directly address current educational demands. Once the content is identified, the appropriate format for the OER must be selected (e.g., text, video, or interactive modules, etc.). For example, topics like orbital mechanics may benefit from visual and interactive materials, such as STK animations, that help demonstrate complex concepts. In contrast, when creating aviation OER, there should be a focus on real-world applications of flight training, including pre-flight checks, emergency response procedures, and weather interpretation.

By tailoring the format to the content, instructors enhance the learning experience and make it easier for students to engage with the material. Once the OER is created, licensing must be considered. Instructors can apply to open licenses, such as Creative Commons, to ensure that the resource can be freely used, modified, and shared by others. After creating and licensing the material, it can then be shared through recognized OER platforms or institutional repositories to promote visibility and access. By contributing quality aerospace OER, MSU Denver instructors can help expand educational opportunities in the field and support the growing demand for accessible resources in STEM.

OER Accessibility

Ensuring accessibility in OER provides equitable learning opportunities to all students, including those with disabilities. One key strategy is to include alternative text (e.g., alt text) for images, which provides descriptions for users who rely on screen readers. This is especially important in aerospace materials, where diagrams and technical illustrations are frequently used to convey complex information.

Another important accessibility measure is the use of closed captions and transcripts for video content. Captions enable individuals who are deaf or hard of hearing to fully engage with video materials, while transcripts allow users to read along or review content at their own pace (e.g., clear descriptions of flight procedures, etc.). Given the prevalence of instructional videos and recorded lectures, captioning is a critical tool for ensuring all students can learn effectively.

Creating accessible file formats, such as tagged PDFs, also supports usability by making documents compatible with assistive technologies. Additionally, structuring documents with clear headers and styles improves navigability, especially for users with cognitive

disabilities or visual impairments. By prioritizing accessibility, instructors ensure that their OER can reach a broader audience while simultaneously fostering inclusivity and learning equity in aerospace education.

Aerospace OER Libraries and Resources

Below are some aerospace OER resources available online:

- [MIT OpenCourseWare](#)
- [NASA Education Resources](#)
- [LibreTexts](#)
- [OER Commons](#)
- [OpenStax](#)
- [FAA Aviation Training Materials](#)
- [Pressbooks](#)
- If you want to learn more about using OER, check out the [OER Starter Kit](#)

Additionally, MSU Denver offers several resources and courses on OER. For more information, check out the [events page](#) on the MSU Denver OER website. Offerings include a Canvas course on OER; contact Emily Ragan (eragan@msudenver.edu) with any questions.