

# Finding and Using OER in the Classroom: The Sciences

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**PR** = some or all materials have been peer reviewed

**AR** = some or all materials have ancillary resources

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## Institutional Repositories

Search when: you are looking for textbooks or courseware (educational materials put together in a modular package / kit for instructors that aligns with a particular course).

- [OpenCourseware](#) (MIT): courseware for many of MIT's undergraduate and graduate level courses, including assessments, lecture notes, assignments, and video lectures. **AR**
- [Galileo](#) (Affordable Learning Georgia): many different types of OER (textbooks, courseware, videos, ancillary resources, worksheets, images) in a number of different subject areas. **AR**
- [Orange Grove](#) (Florida Virtual Campus): a collection of textbooks, courseware, videos, and 3D printing models. **AR**

Tip: Some of these resources are only available in a PDF or non-modifiable version, making them easy to adopt but more time-consuming to adapt.

## Open Repositories

Search when: you are looking for textbooks as well as more discrete learning objects (lesson plans, activities, modules, etc).

- [OER Commons](#) (ISKME): textbooks, activities, case studies, lesson plans, and modules for all disciplines. Extensive filtering options and a well-structured search allow for more accurate, targeted results. **AR**
- [LibreTexts](#) (UC Davis): open textbooks built by faculty, students, and outside experts in a number of different subject areas. **AR**
- [Boundless Catalogue](#) (Lumen Learning): interdisciplinary courseware that includes textbooks, lecture slides, and ancillary resources for introductory courses. **AR**
- [Open Library Portal](#) (eCampusOntario): hundreds of OER available in a number of different subjects. Many textbooks but also has videos, modules, and other OER. **PR AR**
- [Saylor Academy](#): almost 300 courses that have been created from primarily OER around the web, available to be reused. Also has [a list of open textbooks](#) that can be remixed. **AR**

Tip: eCampusOntario has a [print on demand service](#) agreement with the University of Waterloo. If a resource is housed in their library, students can request a copy to be printed and shipped to their house for around \$30 (includes book and shipping).

## Open Referatories

Search when: you want to explore what OER exist in a subject area, as these tools index items from a number of different resources.

- [MERLOT](#): interdisciplinary resource that provides links to learning objects in a myriad of formats. Has extensive filtering options that allow for a highly customized search. **PR**
- [Applied Math and Science Education Repository](#) (National Science Foundation): collection of resources (lesson plans, images, modules) across many different subject areas. **AR**

Tip: Be aware that these can be more challenging to navigate, as links and information about other sites may have changed/expired. MERLOT was originally created to showcase online learning objects (not necessarily open ones) so if you use something from there, check its licensing!

## Open Textbooks

Search when: you are seeking OER in a textbook format.

- [Open Textbook Library](#) (UMinnesota): a large (700+) collection of openly-licensed, peer-reviewed textbooks in all subject areas. **PR AR**
- [Open SUNY Textbooks](#): textbooks written by SUNY faculty in various subject areas. **AR**
- [OpenStax](#) (Rice University): a core collection of open textbooks that support introductory courses in science, math, business, and the social sciences. The [OpenStax CNX](#) platform can be searched to find adaptations or ancillary resources for each text. **PR AR**
- [Open Textbook Collection](#) (BCCampus): over 300 textbooks in a wide variety of subject areas. Many texts are provided in editable versions, with options for to able to filter to adopted (used by others) and accessible. **PR AR**
- [PreTeXt](#) (U of Puget Sound, American Institute of Mathematics): math textbooks created by faculty members from across North America. **AR**
- [Open Textbook Initiative](#) (American Institute of Mathematics): collection of open access math textbooks that at suitable for use in traditional university courses. **PR AR**

Tip: Ancillary resources (slide decks, question banks) are sometimes available for textbook OER. To see if any exist for a particular title, you will usually have to check the individual record.

# Aggregators

Search when: you are looking for a jumping off point or for searching across several OER resources quickly.

- [Mason Online Metafinder](#) (MOM) (George Mason U): allows for a real-time, simultaneous search across 22 sources of OER content for textbooks, images, courseware, and more. **AR**
- [OASIS](#) (SUNY): searches for open content (textbooks, simulations, modules, courseware, podcasts, learning objects) from over 90 different sources. This context is indexed so searches may not be quite as current as MOM. **AR**
- Commons Collections: [Engineering](#) / [Life Sciences](#) / [Medicine + Health Sciences](#) / [Physical Sciences and Math](#): open access scholarship (journal articles, book chapters, conference proceedings, etc.) aggregated from universities and colleges worldwide. **PR**
- [Directory of Open Access Books](#): aggregator of open access books in a wide range of subject areas. **PR**

Tip: The more specific your searches are in these first three tools, the better. Since they're drawing from such a large pool of resources, the advanced search functionality will be helpful. For DOAB, it may be more effective to browse.

# Open Resources

Search when: you are searching for more specialized content or format type in a particular subject area.

## Agricultural Sciences

- [Ag Data Commons](#) (USDA): a repository for open data related to food and agriculture.
- [Open Soil Science](#) (Kansas State/NCSU): open access (and sometimes open source) resources such as images, animations, and a lab manual (complete with ancillary resources and assignments) in the area of soil science. **AR**
- [Virtual Soil Science](#): virtual learning resources and online courses created by scientists, students, and multimedia experts from various postsecondary and research institutions. **AR**
- [Food Systems Case Studies](#) and [Open Case Studies](#) (UBC): openly licensed cases that focus on food systems and sustainability.

## Biological Sciences

- [Biointeractive](#) (Howard Hughes Medical Institute): resources (activities, case students, media) that focus on core concepts and processes in biology, with interdisciplinary resources that connect to environmental science, chemistry, and math and statistics. **AR**
- [Open Education Resources Portal](#) (Royal Society of Biology): a collection of OER that includes lab and field work protocols, data handling exercises, videos of techniques, and multimedia alternatives to wet lab work. **PR AR**

## Engineering and Physical Sciences

- [ChemCollective](#) (Carnegie Mellon): virtual labs, scenario-based learning activities, tutorials, and concept tests for teaching chemistry. **AR**
- [Green Tea Press](#) (Olin College of Engineering): openly licensed books in computer science.
- [MIT Mathlets](#): a collection of Javascript objects for learning about mathematical subjects, along with examples of how to use them in homework, group work or lectures.
- [WeBWorK](#) (Mathematical Association of America) / [MyOpenMath](#): open online homework system for core courses in mathematics.
- [Molecular Workbench](#) (Concord Consortium): a free and open source modelling tool for designing and conducting computational experiments in science. Also has a collection of simulations that can be freely used. Their [STEM Resource Finder](#) provides interactive activities, models, and sequences.

## Veterinary and Medical Sciences

- [Online Veterinary Anatomy Museum](#): a collection of anatomy resources organized into categories according to the species, system, and region covered. **PR**
- Textbooks: [Veterinary Preventative Medicine](#), [Large Animal Surgery](#), [Applied GI Physiology](#)
- [WikiVet](#): veterinary knowledge database that includes flashcards, videos, and quizzes. **PR AR**
- [Community Health Maps](#): openly licensed data and workflows that can be used to collect, analyze, and visualize map data to assist with public health.
- [Activepi](#) (Emory U): freely available digital textbook to learn the foundations of epidemiology. Also contains lessons, homework, and quizzes. **AR**

## Interdisciplinary Resources - May be Useful for Faculty Across CBS / CEPS / OAC / OVC

- [PhET Interactive Simulations](#) (U Colorado): open source simulations, activities, and resources for teaching math and science. All are tested for student effectiveness. **AR**

- [Science Forward](#) (Macaulay Honors College): videos, activities, data sets, and lessons that focus on building critical thinking across the scientific disciplines. **AR**
- [GeoGebra](#): mathematics software that brings geometry, algebra, spreadsheets, graphing, statistics, and calculus together in a single package.
- [InTech Open Books](#): open access books in a wide range of subject areas. Content tends to be written at a more advanced level than textbooks. Suitable for graduate level classes. **PR**
- [Virtual Lab and Science Resource Directory](#) (BCCampus): a list of free (not necessarily open) resources to support remote science education. **PR AR**

Tip: Due to their open license, many of these resources can be combined using [UofG's open publishing software](#) if you'd like to create a single resource.

## Open Media

Search when: you are seeking out free and openly licensed content to complement your slides, lecture notes, or any OER you may be creating or adapting.

- [Public Health Image Library](#): images generated by the Centers for Disease Control and Prevention indexed by Medical Subject Headings (MeSH).
- [Wikimedia Commons](#): images (photographs, illustrations, diagrams) and videos that are openly licensed or in public domain.
- [Google Images Advanced Search](#): search for openly licensed images by selecting the appropriate license choice under "usage rights."
- [The Smithsonian Learning Lab](#): images, audio, videos, and other digital resources from the Smithsonian's 19 museums, 9 major research centres, the National Zoo and more.

Tip: While openly licensed content is free for you to reuse, make sure you follow any terms specified by the creator. This may mean crediting the author and linking to the original source.

## Additional Resources

- [OER Evaluation Criteria](#)
- [OER Accessibility Toolkit](#)
- [About Creative Commons Licenses and What They Do](#) and [Best Practices for Attribution](#)
- [Technology Tools for Teaching and Learning](#)

## Helpful Tips

- Always check for licensing, copyright, and terms of use information — this might be included in one of the Terms of Use / Copyright and Licensing / FAQ / About sections
- In addition to OER, the library can help with media creation, accessibility, and copyright
- Report your adoption — please let us know if you're using an OER! This allows us to provide improved and tailored support
- Need more support or clarification? Get in touch at [liboer@uoguelph.ca](mailto:liboer@uoguelph.ca)!