



DREXEL UNIVERSITY  
College of  
**Medicine**  
*Department of Microbiology & Immunology and  
Institute for Molecular Medicine & Infectious Disease*



AMERICAN  
SOCIETY FOR  
MICROBIOLOGY

## Resources for Online Microbiology and Infectious Diseases Education

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**Disclaimer:** This is not an all-inclusive list. The inclusion of resources in this list does not necessarily imply endorsement, since some have been identified through recommendations by others or independent research by the curator, and they may have not yet been tested by the curator. The curator was involved in developing some of the resources listed, as indicated with an asterisk (\*); opinions are her own. The curator thanks her team’s instructional designers and colleagues for identifying some of these resources over the past few years.

## Calculating Credit Hours for Online Courses

### 1. Time on Task (Rochester Institute of Technology)

<https://www.rit.edu/academicaffairs/tls/course-design/online-courses/time-task>

- Reviews methods on how to convert F2F credit hours to online credit hours

### 2. Assign a Reasonable Amount of Work (Carnegie Mellon University)

<https://www.cmu.edu/teaching//solveproblem/strat-lackmotivation/lackmotivation-05.html#strat1>

- Tips on how to calculate time students need to complete reading assignments, keep students motivated, and more

### 3. American Public University System (APUS) Online Contact Hours Calculator

<https://files.eric.ed.gov/fulltext/EJ1056395.pdf>

Powell, Karan; Helm, Jennifer Stephens; Layne, Melissa; and Ice, Phil (2012) "Quantifying Online Learning Contact Hours," *Administrative Issues Journal*: Vol. 2 : Iss. 2 , Article 12. Available at: <https://dc.swosu.edu/aij/vol2/iss2/12> . Date accessed: 6 June 2020.

- Tool to mathematically quantify time commitment per type of activity
- Addresses different course levels (undergraduate and graduate)

## Educational Resources (Free)

### 1. Open Educational Resources (OER) Commons

<https://www.oercommons.org/browse?f.keyword=microbiology>

- Microbiology and other disciplines
- K-12 and higher education
- Quality and topics may vary
- Some are very dated, but could serve as inspiration
- Free to use under creative commons licenses
- Different providers, from individuals to institutions

### 2. California State University MERLOT collection (Open Resources)

<https://www.merlot.org/merlot/materials.htm?keywords=Microbiology&sort.property=relevance>

- Over 540 peer and non-peer reviewed resources in Microbiology alone (>35,000 across all disciplines)
- Includes animations, assessments, assignments, journal articles and more
- K-12, higher education, and professional education
- Mobile platform resources available

### 3. MIT Open Courseware

<https://ocw.mit.edu/search/ocwsearch.htm?q=microbiology>

- Robust repository of >1,000 resources in microbiology and infectious disease
- High school to higher education

- Includes complete courses, syllabi, assignment, and assessments
- Some are very dated, but could serve as inspiration

#### 4. OER Catalogue (Microbiology)

<https://opened.wixsite.com/opened/copy-of-business-administration>

- Curated list of resources for higher education
- Limited list

#### 5. Open Educational Resources for Microbiology (Washtenaw Community College, Ann Arbor, MI)

<https://libguides.wccnet.edu/oer-subjects/microbiology>

- Includes links to textbooks, journals (including AMS's *mBio*), course resources, interactive materials and more

#### 6. DPDx - Laboratory Identification of Parasites of Public Health Concern (CDC)

<https://www.cdc.gov/dpdx/index.html>

- Parasites A-Z Index (parasite biology, image library, lab diagnosis, recommended primary literature)
- Monthly case studies library (since 2005)
- Diagnostic procedures index (blood, stool, serum/plasma, other specimens)
- Training opportunities

### Educational Resources (Paid)

#### 1. Draw it to Know It

<https://drawittoknowit.com/course/immunology>

- Interactive learning activities and flashcards
- Medical Immunology and Microbiology is under “Graduate and Medical School”
- Includes resources for other biological sciences
- Offers integration with Blackboard and other learning managing systems), course analytics and customer support
- 1-week free trial, monthly subscriptions and institutional accounts available

#### 2. ProctorU

<https://www.proctoru.com>

- Virtual or remote proctoring service with student ID verification
- Different services available (automated vs. live ID verification by a human)

### Free Stock Images and Photos

#### 1. CDC News Room (Digital Media)

<https://www.cdc.gov/media/subtopic/images.htm>

- High resolution, public domain images

#### 2. CDC Public Health Image Library (PHIL)

<https://phil.cdc.gov>

### 3. Pixabay

<https://pixabay.com>

- Free images and royalty free stock

### 4. Wikimedia Commons

[https://commons.wikimedia.org/wiki/Main\\_Page](https://commons.wikimedia.org/wiki/Main_Page)

- Millions of freely usable media files
- Anyone can contribute

## Learning Tools

NOTE: If not a tool provider partnered with your LMS, check and make students aware of the tool's privacy policy by posting a link to it in the LMS. Be prepared for “Plan B” if students object to the privacy policy of the tool.

### 1. Padlet (Free)

<https://padlet.com>

- Collaborative web-based tool
- Free and paid
- Allows development of multimedia poster boards
- Great for team projects and to develop digital research posters

### 2. Screencast-O-Matic (Free or Paid)

<https://screencast-o-matic.com>

- Develop and share screen recordings
- Very easy to use; relatively inexpensive

### 3. VoiceThread

<https://voicethread.com>

- Popular web-based application that allows voice interaction with and among students
- Not integrated with Bb Learn

### 4. Flipgrid (Free)

<https://help.flipgrid.com/hc/en-us/articles/360007460474>

- Provide student-to-student and faculty-to-student video feedback
- Used in K-12 and higher education

## Multimedia Resources (Free)\*

### 1. CD4 Hunter™

<https://apps.apple.com/us/app/cd4-hunter/id1186846022>

[https://play.google.com/store/apps/details?id=edu.drexel.ducom.hiv1&hl=en\\_US](https://play.google.com/store/apps/details?id=edu.drexel.ducom.hiv1&hl=en_US)

- Mobile game about how HIV attaches and enters T cells

- Developed by the Institute for Molecular Medicine and Infectious Disease at Drexel University College of Medicine
- Free download
- Apple and Android devices

## 2. Malaria Invasion™

<https://apps.apple.com/us/app/malaria-invasion/id1426466230>

[https://play.google.com/store/apps/details?id=edu.drexel.ducom.malaria1&hl=en\\_US](https://play.google.com/store/apps/details?id=edu.drexel.ducom.malaria1&hl=en_US)

- Mobile game about how *Plasmodium falciparum* invades red blood cells
- Developed by the Institute for Molecular Medicine and Infectious Disease at Drexel University College of Medicine
- Free download
- Apple and Android devices

## 3. Hep B-Ware™

[https://play.google.com/store/apps/details?id=edu.drexel.ducom.hepb1&hl=en\\_US](https://play.google.com/store/apps/details?id=edu.drexel.ducom.hepb1&hl=en_US)

- Mobile game that teaches about the hepatitis B replication cycle
- Developed by the Institute for Molecular Medicine and Infectious Disease at Drexel University College of Medicine
- Free download
- Only on Android devices for now

## 4. Kahoot!

<https://kahoot.com>

- Web-based or mobile based customizable platform
- Free and paid options
- Extensively used in K-12
- Can be used for fun interactive assessments synchronously or asynchronously

## 5. Microbe TV

<https://www.microbe.tv>

- Multimedia platform established by virologist Vincent Racaniello, PhD
- From the website: “MicrobeTV is an independent podcast network for people who are interested in the life sciences. Our shows are about viruses, microbes, parasites, evolution, and even urban agriculture.”
- Dr. Hartmann and the educational mobile game CD4 Hunter were featured in episode No. 489 of This Week in Virology (TWiV)

## Online Teaching and Learning Readiness Self-Assessments

### 1. Faculty Readiness Self-Assessment (Free - Penn State University)

<https://behrend-elearn.psu.edu/weblearning/FacultySelfAssessment/>

- From the website: “This self-assessment for online teaching will allow you to evaluate and reflect upon your competencies in key areas of online teaching and provide a

baseline of your pedagogical, technical, and administrative skills. As part of your results, you will receive additional guidance/resources for each competency to better prepare you for the online teaching environment.”

- Results and tips are emailed to you; not saved in PSU’s server.
- Takes about 10-15 min

## 2. Student Readiness Self-Assessment (Free - Penn State University)

<http://tutorials.istudy.psu.edu/learningonline/ORQ/ORQ.htm>

- From the website: “Before enrolling in an online course, you should first assess your readiness for stepping into the online learning environment. Your answers to the following questions will help you determine what you need to do to succeed at online learning.”
- Survey results appear on the screen, not emailed.
- Recommended for potential students with no prior online learning experience.
- Takes about 10-15 min

## Quality Assurance of Online Courses

### 1. Quality Matters (QM)

<https://www.qualitymatters.org>

- A nationally recognized grassroots organization
- Focus: measure and guarantee the quality of online courses
- Rubrics and standards to benchmark the quality of your courses
- Professional development opportunities available

### 2. Online Learning Consortium (OLC)

<https://onlinelearningconsortium.org/about/mission-vision/>

- “OLC is a collaborative community of higher education leaders and innovators, dedicated to advancing quality and leadership in digital education.”
- Literature and professional development opportunities available
- Freely usable media files
- Anyone can contribute

### 3. Factors that Impact Course Quality (Review)

J. McClary (2013) “Factors in High Quality Distance Learning Courses”. *Online Journal of Distance Learning Administration*, Volume XVI, Number II, Summer 2013. Available at <https://www.westga.edu/~distance/ojdl/summer162/mcclary162.html>. Date accessed: 6 June 2020.

## Tips for Online Teaching

### 1. Delivering High-Quality Instruction Online in Response to COVID-19 (Online Learning Council)

<https://onlinelearningconsortium.org/tools/delivering-high-quality-instruction-in-response-to-covid-19-faculty-playbook/>

- Faculty-focused playbook developed by the Online Learning Consortium
- Quick guide to help you design, enhance and optimize your courses
- Tips are transferrable to F2F and hybrid instruction

## 2. How to Humanize Your Online Class

<https://create.piktochart.com/output/5383776-how-to-humanize-your-online-cl>

- Tips on how to design and teach online so your students are motivated to login week after week
- Includes list of scholarly references on the subject

## 3. Types of interactions (UC Davis)

[https://canvas.ucdavis.edu/courses/34528/pages/types-of-interaction?module\\_item\\_id=4974](https://canvas.ucdavis.edu/courses/34528/pages/types-of-interaction?module_item_id=4974)

- Succinctly describes the 3 types of key interactions
- Gives examples of course design activities for each one

## 4. Enhancing Course Interactions

- Krishnamurthi, M. Enhancing Student Teacher Interaction In Internet Based Courses. Paper presented at 2000 Annual Conference, St. Louis, Missouri. 18-21 June 2000. Available at <https://peer.asee.org/8359>. Date accessed: 7 June 2020.
- Su, B et al. The Importance of Interaction in Web-Based Education: A Program-level Case Study of Online MBA Courses. Journal of Interactive Online Learning. Volume 4, Number 1 Summer 2005. Available at <https://www.ncolr.org/issues/jiol/v4/n1/the-importance-of-interaction-in-web-based-education-a-program-level-case-study-of-online-mba-courses.html>. Date accessed: 7 June 2020.

## 5. Adjusting Class Size for Online Learning (Review)

Taft, SH; Kesten, K; El-Banna, MM. One Size Does Not Fit All: Toward an Evidence-Based Framework for Determining Online Course Enrollment Sizes in Higher Education. Online Learning, [S.l.], v. 23, n. 3, sep. 2019. ISSN 2472-5730. Available at: <https://olj.onlinelearningconsortium.org/index.php/olj/article/view/1534>. Date accessed: 6 June 2020. doi:<http://dx.doi.org/10.24059/olj.v23i3.1534>.

## 6. Online teaching and COVID-19 in China (Case Study)

Bao W. COVID-19 and online teaching in higher education: A case study of Peking University. Hum Behav & Emerg Tech. 2020;2:113–115. <https://doi.org/10.1002/hbe2.191>. Available at <https://onlinelibrary.wiley.com/doi/full/10.1002/hbe2.191>. Date accessed: 6 June 2020

## 7. The Difference Between Motivation and Engagement

<https://www.khorus.com/blog/motivation-vs-engagement-is-there-a-difference/>

- Web article by Joel Trammell for Khorus (Sept 2019)

- Focuses on employee motivation, but the concepts are highly transferrable to the learning environment
- Provides a description of four profiles of employees (students) and what a leader (faculty) can do to maximize motivation and engagement

## Virtual Internships and Capstone Projects (Multiple Disciplines)

### 1. Virtual Student Federal Service (VSFS)

<https://vsfs.state.gov>

- Virtual internships for students with the US government, including the department of Health and Human Services
- May not be necessarily focused on microbiology and immunology, or infectious disease
- Opportunities change year after year
- Applications are accepted between July 1 and July 31. Selected e-Interns work on projects virtually from September through May (10 hours per week).

### 2. Capsource (paid service)

<https://capstonesource.com>

- Develops internships and capstone projects (at a cost for the academic institution)
- Most opportunities are business oriented but the company is very flexible and willing to accommodate to develop opportunities that fit specific program needs.

## About the Curator and Speaker at the 779th Monthly Branch Meeting – Norman Willett Memorial Lecture

### Speaker/Curator Information:

[Sandra Urdaneta Hartmann, MD, PhD, MBA](#),  
Professor, [Department of Microbiology and Immunology](#), and  
Director, [Center for Business and Program Development](#) at the  
[Institute for Molecular Medicine and Infectious Disease](#)  
Drexel University College of Medicine, Philadelphia, PA

**Bio:** Since 2012, Dr. Sandra Urdaneta Hartmann or Dr. SUH, as she’s best known among her students, has been overseeing the implementation of online learning in the Department of Microbiology and Immunology at Drexel’s College of Medicine. By 2016, under Dr. Hartmann’s guidance and leadership, the Department of Microbiology and Immunology went from zero to seven online and hybrid MS programs. These include a series of four interdisciplinary degree programs in biomedical technology commercialization that Dr. Hartmann designed, and currently directs and teaches in: the [MS in Biomedicine and Business](#), [Digital Media](#), [Entrepreneurship](#), and [Law](#). Dr. Hartmann has also led the teams behind two award-winning, science-driven mobile games focused on cell entry mechanisms of HIV and *Plasmodium falciparum*, respectively called CD4 Hunter™ and Malaria Invasion™. A third mobile game that teaches about the replication cycle of hepatitis B was released in 2020 (Hep B-Ware™). These



games are free downloads on the Apple and Google Play app stores. This digital game-based learning initiative has been featured in Dr. Vincent Racaniello’s “This Week in Virology” (TWiV) podcast Episode 489, on EdSurge, and in Philadelphia’s WHYY’s “The Pulse.” Dr. Hartmann received a 2014 Outstanding Online Faculty Award from Drexel University Online, and a 2018 Best Professor Award for the Interdisciplinary and Career-Oriented Division from the College of Medicine’s Graduate School of Biomedical Sciences and Professional Studies. Her team also received an Honorable Mention in 2016 from the Academic Division of the International E-Learning Association for their work on converting a face-to-face online graduate bacteriology course into an interactive online course. Prior to a career as an innovative educator, Dr. Hartmann was a pre-clinical and translational researcher of microbicides to inactivate HIV in breastmilk, funded by the NIH and the Bill and Melinda Gates Foundation. She was also the CEO of a startup company to commercialize this technology. Dr. Hartmann earned an MD from the University of Zulia, in her native Venezuela (1998); a PhD in microbiology and immunology from Penn State University (2004); and an MBA with a concentration in entrepreneurship from Drexel’s LeBow College of Business (2009). You are welcome to connect with Dr. Hartmann on LinkedIn at <https://www.linkedin.com/in/drsuhartmann/>.