**2019 SEA-PHAGES Bioinformatics Workshop Learning Objectives and Resources**

**Workshop Day 1: Monday December 9th**

| **Category** | **Topic** | **Learning Objective** | **Resources** |
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| **Phage Biology** | Review of Bacteriophage Biology Basics from the Phage Discovery Course | Identify the common structural components of bacteriophages | [Bacteriophage Biology](https://seaphagesphagediscoveryguide.helpdocsonline.com/3-0-overview) |
| Outline the lytic and lysogenic bacteriophage life cycles |
| Compare and contrast virulent and temperate bacteriophages |
| Define bacteriophage host range and list some factors that influence if a particular phage can infect a particular bacterium |
| List some ways by which host cells can become resistant to bacteriophage infection |
| Retrieving Basic Information About Your Phage | Retrieve information about the biology of your phage (phage morphology, plaque morphology, virulent or temperate, etc.) | [PhagesDB](https://phagesdb.org/) |
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| **Mechanics** | Using the Bioinformatics Guide | Access and search the Online Bioinformatics Guide | [How to Use the SEA-PHAGES Bioinformatics Guide](https://seaphagesbioinformatics.helpdocsonline.com/article) |
| Software Installation | Install VirtualBox on your computer that is able to run Windows, and install a functional copy of Windows within Virtual Box | [Installing Windows 10 as a Virtual Machine on a Mac](https://phagesdb.org/media/docs/InstallingWindowsOnMac.pdf) |
| Install a properly functioning version of DNA Master on your computer  Install a properly functioning version of DNA Master on the computers your students will be using, or develop a reasonable plan to accomplish this task | [Installing DNA Master](https://seaphagesbioinformatics.helpdocsonline.com/article-67)  [Troubleshooting DNA Master Installations](https://seaphagesbioinformatics.helpdocsonline.com/article-99) |
| Update DNA Master to the latest version | [Updating DNA Master](https://seaphagesbioinformatics.helpdocsonline.com/article-62) |
| **Mechanics** | Software Installation | Change preference settings in DNA Master to the SEA-PHAGES recommended settings  Recognize improperly set preferences as a common issue that may happen in your classroom | [Setting DNA Master Preferences](https://seaphagesbioinformatics.helpdocsonline.com/article-66) |
| Acquiring Data | Download a fasta sequence file from PhagesDB and save the file in the correct location | [FASTA-Formatted Files](https://seaphagesbioinformatics.helpdocsonline.com/article-8)  [Retrieving Your Finished Genome Sequence](https://seaphagesbioinformatics.helpdocsonline.com/article-78) |
| Successfully import a fasta file into DNA Master | [Importing your FASTA-formatted sequence into DNA Master](https://seaphagesbioinformatics.helpdocsonline.com/article-72) |
| Auto-annotate a phage genome using DNA Master  Evaluate that an auto-annotation has successfully completed by demonstrating that Glimmer, GeneMark, and Aragorn data are present in the Notes field and log output files | [Generating a Rough Draft of Your Annotation using Auto-Annotate](https://seaphagesbioinformatics.helpdocsonline.com/article-76) |
| Save a DNA Master file (.dnam5) and re-open it later | [Saving your DNA Master File](https://seaphagesbioinformatics.helpdocsonline.com/article-79)  [Opening or Re-Opening a Saved DNA Master File](https://seaphagesbioinformatics.helpdocsonline.com/article-74) |
| BLAST all genes from an auto-annotated phage genome within DNA Master | [BLASTing and ReBLASTing All Genes in DNA Master](https://seaphagesbioinformatics.helpdocsonline.com/article-103) |