

## Viewing: **BIOL444: Bioinformatics**

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Associated Course

[BIOL 444:Bioinformatics](#)

### History

1. Mar 4, 2021 by  
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(tgrana)

Faculty Name	Theresa M Grana	Email
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Department	Biology	
College	College of Arts and Sciences	
Request Type	Digital Intensive	
Title	BIOL444: Bioinformatics	
Associated Course	BIOL 444 - Bioinformatics	

Semester/Term Proposed for First Offering:

Fall 2021

Frequency of  
Offering

Every Year

Digital Intensive  
designation  
requested for:

The course and the faculty member teaching this course (other faculty who teach the course will not have their courses designated automatically; other faculty will need to apply for designation independently.)

If the course is being proposed so that it receives Digital Intensive designation, Department Chairs should complete the following section:

How will the  
department help  
prepare new  
instructors to teach  
this course as DI?

Assistance from previous instructor/Vision and Change Pedagogy training envisioned by our department's assessment committee.

How often will the  
course be taught?

every year or every third semester

**Digital Intensive SLOs - Using the form below, address each of the three Student Learning Outcomes.**

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Using the form below, address each of three of the learning outcome of the Digital Intensive program and indicate the assignments or other structured activities that will be used to meet each SLO. Typically, these outcomes will be the focus of three different assignments, but in some cases a single assignment or activity could address multiple areas. Whatever the arrangement cases, please complete each section with the assignment or activity that best demonstrates the course's attention to each goal, respectively.

SLO: Successfully locates and critically evaluates information using the Internet, library databases, and other digital tools.

Assignment Name: Project 2, Project 3, Project 4, Project 5

Assignment Description: Bioinformatics is defined as the use of computers in biology so it is an obvious Digital Intensive Course. My course has five units, two of which used original data to generate something new. The other three projects study and interpret published data. Each of these projects involves literature searches for primary journal articles, analysis of the articles, and analysis of associated data in databases or bioinformatics software. Students critically evaluate what they find in article "outline" assignments (guided readings) and in the products of their projects (oral presentations or posters).

Instructional support for each project includes the documents attached, along with group collaborations in-class and help from the instructor. (For all projects, students worked in groups and used Canvas Discussions/Google Docs for records and group exchanges.) Research records include citations of original sources, accession numbers and methods used. Recorded oral presentations and poster displays were the main products of each project. The work is evaluated using detailed rubrics that clearly lay out what is expected in each project, and credit is earned through an iterative feedback process.

While most results were private to the course, students submitted their work on Unit 3 to the Genome Solver database, because it is part of a larger "Community Science" project.

The iterative nature of the group projects allows students do develop their skills at exchanging information and ideas. They are asks to comment on or review other student's products along the way.

My sustainability plan is that each time I teach this course I re-work the projects to use newer research papers and approaches. You can see that two of the projects this past year were COVID-related.

SLO Rationale: Listed below are Assignments using Literature Research and NIH databases or other databases for Genomic information.  
Project 2 COVID phylogeny Assignment and rubrics  
Project 3 Pipeline Project  
Project 4 COVID GWAS Assignment  
Project 5 Microbiome Assignment

Type of Assignment:	Database Research project
Assessment:	Letter grade Peer evaluation Rubric
Support:	In-class instruction or demonstration Online training material Peer support
Availability of Student Work - Public:	Other
Social Media Platforms:	
Other	Database submission for one project
Availability of Student Work - Private:	Canvas
Sustainability Plan for Public Projects:	

Using the form below, address each of three of the learning outcome of the Digital Intensive program and indicate the assignments or other structured activities that will be used to meet each SLO. Typically, these outcomes will be the focus of three different assignments, but in some cases a single assignment or activity could address multiple areas. Whatever the arrangement cases, please complete each section with the assignment or activity that best demonstrates the course's attention to each goal, respectively.

SLO:	Uses digital tools to safely, ethically, and effectively produce and exchange information and ideas
Assignment Name:	Projects 2 and 3 (more than this in non-pandemic years)
Assignment Description:	Included with the first SLO - a database/journal article research project with iterative feedback and peer collaboration. See also the attached assignment descriptions.
SLO Rationale:	Projects 2 and 3 used original data in 2020, which involved accessing annotated DNA sequences available on the NIH or COVID-specific databases. Students developed a research question and then attempted to address the question with the dataset they choose.

Everything we use is freely available, but we discuss appropriate attributions. We also talk about firewalls protecting human genomic data. Everything we did in class was safe and ethical.

Project 2 used technologies such as BLAST and other database search tools, and had a choice of phylogeny software for Project 2. They may try to work with several different programs and then choose the one that best works for their project question or technology situation (SLO2).

Type of Assignment:	Database Research project
Assessment:	Letter grade Peer evaluation Rubric
Support:	In-class instruction or demonstration Individual or small-group consultations Peer support
Availability of Student Work - Public:	Other
Social Media Platforms:	
Other	Submission to Genome Solver database
Availability of Student Work - Private:	Canvas
Sustainability Plan for Public Projects:	None or N/A Other
Other	Genome Solver will use our data for more research /potential publication

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Using the form below, address each of three of the learning outcome of the Digital Intensive program and indicate the assignments or other structured activities that will be used to meet each SLO. Typically, these outcomes will be the focus of three different assignments, but in some cases a single assignment or activity could address multiple areas. Whatever the arrangement cases, please complete each section with the assignment or activity that best demonstrates the course's attention to each goal, respectively.

SLO:	Creatively adapts to emerging and evolving technology
Assignment Name:	Projects 2 and 3
Assignment Description:	See attached files, and description with the first SLO
SLO Rationale:	In the most recent iteration of the course, the students used a COVID database for Project 2, which is obviously emerging and evolving (SLO3).

For Project 3, In Fall 2020, students used a newly developed BLAST Pipeline developed at GenomeSolver. (For previous iterations of this project students BLASTed manually.) They pasted code from a GoogleColab into GitHub and entered their BLAST queries. Some students had trouble with the GitHub software terminating early when a BLAST hit above the threshold set in the software code was not found in the database. A portion of the students had to work around this by re-trying or BLASTing manually. It was frustrating, but involved adaptation, just like real research. (I was surprised how positive students were about this at the end of the semester, because they sure were stressed in the middle of it.) Frustrations like this are frequently encountered in the ever-evolving world of bioinformatics tools and databases. We always have a project that is more challenging and requires more flexibility and creativity to execute than expected. That's why it fits SLO3.

Type of Assignment:	Database Research project
Assessment:	Letter grade Peer evaluation Rubric
Support:	In-class instruction or demonstration Individual or small-group consultations Peer support
Availability of Student Work - Public:	Other
Social Media Platforms:	
Other	Genome Solver Database
Availability of Student Work - Private:	Canvas
Sustainability Plan for Public Projects:	None or N/A Other
Other	Most projects are executed as training in the process of science, but the Project 3 will be carried on by GenomeSolver and future iterations of the course.

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### Additional Digital Intensive Elements

Please describe any other aspects of the course not listed for each SLO that helps characterize it as Digitally Intensive.

The entire course uses primary literature, genome databases, data analysis, and results presentations in an iterative fashion. Just a quick summary.

Please attach a sample syllabus for this class, assignment descriptions, or any other documents that may help evaluate this course's Digital Intensive status.

[BIOL444\\_Syllabus2020-WL.pdf](#)  
[Project2\\_COVIDphylogeny\\_Assignment.pdf](#)  
[Project5\\_MicrobiomeAssignment.pdf](#)  
[Project4\\_COVID\\_GWAS\\_Assignment.pdf](#)  
[Project3\\_Pipeline Project Description.pdf](#)

Reviewer  
Comments