

# **Practical Computing for Biology (BIOL 701/801)**

## **Syllabus, Spring 2024**

BIOL701 (CRN 32481), 3 cr

BIOL801 (CRN 32482), 3 cr

Class Times/Locations: MW 3:00-5:40 pm; MGB 311; 11-March to 22-April

### **Instructor:**

Dr. Daniel Barshis: Office, 308 Mills Godwin; Office phone, 757-683-3614; email [dbarshis@odu.edu](mailto:dbarshis@odu.edu); office hours M 2-3pm or by appointment

### **Course Description:**

This course is a hands-on training course that shows you how to use general computing tools to work more effectively in the biological sciences. It pulls together a broad range of powerful and flexible tools that are applicable to ecologists, molecular biologists, physiologists, and anyone who has struggled with large or complex data sets. We will go over text file manipulation with regular expressions, basic shell scripting, and programming in Python.

### **Learning Objectives:**

1. Students will become comfortable using computer science tools and programming techniques to enhance/improve data manipulation and analysis
2. Students will be able to perform the following tasks:
  - a. Editing/modifying text files using regular expressions
  - b. Basic bash scripting
  - c. Python programming

### **Text:**

Haddock, S. H. D. and Dunn, C. W. (2010). Practical Computing for Biologists. [Sinauer Associates](<http://practicalcomputing.org>). Recommended but scanned copies of relevant chapters available.

Here are some of the appendices from the book, which summarize frequently used commands: [Appendices]([http://practicalcomputing.org/files/PCfB\\_Appendices.pdf](http://practicalcomputing.org/files/PCfB_Appendices.pdf))

### **Attendance and responsibilities:**

Attendance at every class is expected. Any absences must be discussed with the course instructor at least in the week prior to their expected occurrence.

### **Safe Space/Diversity, Equity, and Inclusion Statement:**

Our classroom is a safe space and an equitable and inclusive environment. Everyone deserves dignity, civility, and empathy. Our diversity is a strength and a critical resource for our learning environment. We value our classmates, peers, and community for their diversity including, but not limited to, race/ethnicity, gender identities, gender expressions, sexual orientation, socio-economic status, age, disabilities, religion, regional

background, Veteran status, citizenship status, and nationality. An inclusive and equitable learning environment enhances innovation and creativity, helping to ensure everyone's success in this course, ODU, and beyond. You are encouraged to speak up and share your views and opinions but realize that you are doing so in an environment in which we are all expected to interact and engage respectfully.

My number one priority is your well-being and success, so please let me know if you require any specific accommodations, if you are experiencing a health or economic challenge that may affect your performance, and your preferred pronouns. Also, I welcome your suggestions and comments on how to create a better inclusive and equitable learning environment for yourself or for others.

### **Course organization:**

The website for this course [https://bitbucket.org/dbarshis/22sp\\_pcfb/src](https://bitbucket.org/dbarshis/22sp_pcfb/src), has all the course content, instructions, and assignments.

The course will be organized into two parts. The first 3.5 weeks will consist of lectures, tutorials, and small assignments. The remainder of the course will consist of student-lead hackathons, wherein a student group will be responsible for introducing a particular problem at the end of class on Monday. By Tuesday night at 11:59pm, all students will be required to have submitted comments/ideas/suggestions on the class discussion board on how to solve the student group problem. Wednesday's class will consist of a group brainstorming session lead by the student group and a group hackathon where the class as a whole works on the particular problem. Monday's session will consist of a continued work session, a wrap-up for the problem, and an introduction of the next group's problem.

### **Assignments and grading:**

- Group presentation/task (50%; 100 points)
- Attendance and participation (25%; 50 points)
- Homework/exercises (25%; 50 points)

Note: 801 students will be expected to present an additional, special "use case" of the skills learned in the course that is applicable to their research during the group presentation sessions compared to 701 students

Letter grades will be assigned according to the University scale: A=90.0-100.0%

B=80.0-89.9% C=70.0-79.9% D=60.0-69.9% F=<60.0%

There will not be a curve, and I will not offer additional extra-credit assignments outside of what is in the syllabus.

### **Schedule:**

Week	Date	Topic	Chapter
1	M 3/11	Computer Setup/Wiki Intro	1
		Regular Expressions: Powerful Search & Replace	2
1	W 3/13	Exploring the Flexibility of Regular Expressions	3
		Command-line Operations: the Shell	4

2	M 3/18	Handling Text in the Shell Scripting with the Shell	5 6
2	W 3/20	Scripting with the Shell Components of Programming	6 7
3	M 3/25	Beginning Python Programming Python: Decisions and Loops	8 9
3	W 3/27	Python: Reading & Writing files Python: Lists & Dictionaries	10 10
4	M 4/01	Python: Merging Files Debugging Strategies Group 1 intro to task	11 13
4	W 4/03	Group 1 Plan of attack/workday (Discussion comments due 2:59pm)	
5	M 4/08	Group 1 workday/wrap-up Group 2 intro to task	
5	W 4/10	Group 2 Plan of attack/workday (Discussion comments due 2:59pm)	
6	M 4/15	Group 2 workday/wrap-up Group 3 intro to task	
6	W 4/17	Group 3 Plan of attack/workday (Discussion comments due 2:59pm Wed) Group 4 intro to task	
7	M 4/22	Group 4 workday/wrap-up	

### **Medical conditions/access issues:**

Students with disabilities seeking specific accommodations are encouraged to contact the Office of Educational Accessibility (OEA), Phone #: 757-683-4655. Please note that I will not provide any accommodations for any psychological or learning disabilities without prior documentation from OEA.

### **Honor code:**

By enrolling in this course, you are agreeing to abide by the University Honor Code. Information about the University Honor Code, including explicit definitions of various forms of cheating including plagiarism and unauthorized collaboration, is available at: [http://orgs.odu.edu/hc/pages/Honor\\_Code.shtml](http://orgs.odu.edu/hc/pages/Honor_Code.shtml). You are responsible for reading and understanding this material. If you have any question about whether a particular action constitutes cheating, ask the instructor for clarification. Academic dishonesty or misconduct in any form will not be tolerated during this course. Any instances of cheating will be referred to the Office of Student Judicial Affairs, and grade sanctions will be imposed up to and including failure of the course.

### **Conflict resolution:**

As course instructor, I will make every effort to resolve conflicts or difficulties in a timely and fair manner. Issues that cannot be resolved by discussions with me should be brought to the attention of Dr. Holly Gaff, Department Chair, or her designee.

**Changes to course and/or requirements:**

We reserve the right to make appropriate changes to the course content and schedule of lectures and labs following timely notification to students.