

Cover Sheet: Request 12249

BSC4XXX/6XXX Computational Tools for Research in Biology

Info

Process	Course New Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Matthew Gitzendanner magitz@ufl.edu
Created	1/23/2018 4:22:25 PM
Updated	4/11/2019 9:08:57 AM
Description of request	<p>I have revised the course description and syllabus. I tried to use http://www.syllabus.ufl.edu/media/aaufledu/policies/Sample-Syllabus.pdf as a template for required links and policies, and believe they are all there.</p> <p>Please let me know if there are additional questions.</p> <p>Thanks, Matt</p>

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CLAS - Biology 011690003	Marta Wayne		4/5/2018
No document changes					
College	Recycled	CLAS - College of Liberal Arts and Sciences	Joseph Spillane	The College Curriculum Committee recycles this request, with the following changes to be made: 1) Please explain the Biology-specific component to this course, in both the request and the course description; 2) please add something to the course title to indicate the biology-specific dimension of the course; 3) if this course is to be co-listed, please include both undergraduate and graduate versions of the course syllabus, with some explanation of the difference; 4) why is this course proposed as variable credit?; 5) a course at this level must have a pre-requisite; 6) please change Course Objectives to replace "understand" with something more measurable, like 'describe' or 'explain'; 7) the Links and Policies are incomplete, please consult http://syllabus.ufl.edu/media/aaufledu/policies/Sample-Syllabus.pdf ; 8) please delete the reference to "Grade Curve Policy" from the submission	5/6/2018
No document changes					
Department	Approved	CLAS - Biology 011690003	Nicole Gerlach		8/12/2018

Step	Status	Group	User	Comment	Updated
No document changes					
College	Conditionally Approved	CLAS - College of Liberal Arts and Sciences	Joseph Spillane	Still needs the links and policies section to be complete (see http://www.syllabus.ufl.edu/med 2) course description needs to conform to standard style (see http://clas.ufl.edu/curriculum/do	9/10/2018
No document changes					
Department	Approved	CLAS - Biology 011690003	Marta Wayne		3/13/2019
No document changes					
College	Approved	CLAS - College of Liberal Arts and Sciences	Joseph Spillane		3/17/2019
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			3/17/2019
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

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Please let me know if there are additional questions.

Thanks,

Matt

Submitter: Matthew Gitzendanner magitz@ufl.edu

Created: 4/11/2019 9:07:33 AM

Form version: 5

Responses

Recommended Prefix BSC

Course Level 4

Number XXX

Category of Instruction Joint (Ugrad/Grad)

Lab Code None

Course Title Computational Tools for Research in Biology

Transcript Title Comp Tools Rsrch Bio

Degree Type Baccalaureate

Delivery Method(s) On-Campus

Co-Listing Yes

Co-Listing Explanation For each problem set, graduate students will have an additional question. Additionally, graduate students will submit coding exercises using github.com, gaining additional familiarity with this popular software development tool.

Effective Term Earliest Available

Effective Year Earliest Available

Rotating Topic? No

Repeatable Credit? No

Amount of Credit 3

S/U Only? No

Contact Type Regularly Scheduled

Weekly Contact Hours 3

Course Description Introduces computational tools for research: Linux command line, Python scripting, databases. Prepares students to conduct large-scale data analysis on high-performance computing resources.

Prerequisites Junior standing.

Co-requisites None

Rationale and Placement in Curriculum A growing number of scientists are expected to possess computational skills such as basic Linux command-line, using high-performance computing resources, and basic scripting. This course is an introduction to these skills and will serve as a foundation for further computational skill development. This course is designed for advanced undergraduate and graduate students.

Course Objectives By the end of the course, the student will:

- Demonstrate how technology infrastructure can improve research and open new avenues of investigation.
- Competently navigate the Unix/Linux command line interface.
- Effectively and efficiently manipulate text files, performing complex regular expression replacements, reformatting and merging files in various ways.
- Raise and address current issues through class participation and discussion.

- Use High Performance Computing resources such as the UF Research Computing for cluster-based analyses. Including batch scripting and running multi-processor applications (threaded and MPI).
- Explain the basic anatomy of computer scripts/programs, with particular focus on Python scripting.
- Construct analytical pipelines to accomplish complex tasks.
- Describe basic database design, creation and manipulation. Perform scripted database operations for information discovery, data exploration and research data curation.
- Have a basic understanding of research graphics formats, preparation and manipulation

Course Textbook(s) and/or Other Assigned Reading This course will use various free texts and web sites. The main texts for the course are:

- The Linux Command Line: <http://linuxcommand.org>
- Python For Everyone: <https://www.py4e.com>

Each of these is available as a free PDF download or for purchase in print.

Weekly Schedule of Topics

Week 1: Introduction and course objectives.
 UF Research Computing Intro & getting started
 Week 2: Linux Basics: Command line
 Basics: Pipes and Redirects
 Linux Basics: Text files, regular expressions
 Week 3: Labor Day Holiday—No Class
 Shell Scripts
 Shell Scripts, Version Control: git and GitHub
 Week 4: Version Control: git and GitHub
 Using UF Research Computing resources
 Running batch jobs, Compiling source code
 Week 5: Singularity/Docker
 Data Management/Data Curation
 Wrap-up
 Week 6: Introduction to Python
 Python data types
 Working in Python, Flow Control
 Week 7: Working in Python, Functions
 Working in Python: try/except, Strings, File I/O
 Lists, Dictionaries, Tuples
 Week 8: SciPy, NumPy, Pandas
 Independent work/in-class exercises
 Scripting data acquisition
 Week 9: Class project
 Matplotlib and data visualization
 Class project, continue
 Week 10: Writing functions
 Class project, complete
 Python wrap-up
 Week 11: Overview of databases
 Database design
 Homecoming—no class
 Week 12: Setting up a database
 SQLAlchemy Introduction
 SQLAlchemy continued
 Week 13: Veteran's Day Holiday—No class
 Setting up database with SQLAlchemy
 Uses of databases
 Week 14: Class projects begin
 Thanksgiving break—No class
 Thanksgiving break—No class
 Week 15: Class projects, continue
 Graphics

Class projects, complete

Links and Policies <http://helpdesk.ufl.edu>

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/#hgrades>

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

<http://www.dso.ufl.edu/drc/>

<https://evaluations.ufl.edu/> and <https://evaluations.ufl.edu/results/>

<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

<https://counseling.ufl.edu/>

<https://police.ufl.edu/>

Grading Scheme GRADING

- QUIZZES: 5 @ 20 points each (33% of final grade)
- PROBLEM SETS: 5 @ 20 points each per module (33% of final grade)
- CLASS PROJECTS: 2 @ 40 points each (27% of final grade)
- CLASS PARTICIPATION: 20 points (6% of final grade)
- o 10 points for github.com commits, 10 points for code peer review comments

GRADE DISPUTES:

Should a student wish to dispute any grade received in this class (other than simple addition errors), the dispute must be in writing and be submitted to the instructor within a week of receiving the grade. The dispute should set out very clearly, the grade that the student believes the assignment should have received as well as why he or she believes that he or she should have received such a grade.

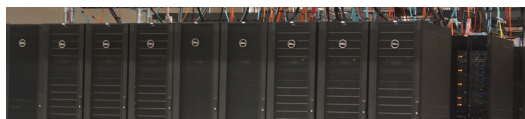
GRADING SCALE (& GPA EQUIVALENT):

A
100-93
(4.0) A-
92-90
(3.67) B+
89-87
(3.33) B
86-83
(3.0) B-
82-80
(2.67) C+
79-77
(2.33) C
76-73
(2.0) C-
72-70
(1.67) D+
69-67
(1.33) D
63-66
(1.0) D-
62-60
(0.67) E
59-
(0)

Instructor(s) Matthew Gitzendanner

UNIVERSITY OF FLORIDA
COMPUTATIONAL TOOLS FOR RESEARCH IN
BIOLOGY

BSC 4###
3 Credits
Fall 2018
Room: TBD
M,W,F 8:30-9:20 (2nd Period)



INSTRUCTOR:

Matt Gitzendanner
magitz@ufl.edu
Dickinson Hall room 301c
273-1960
Office Hours:

CATALOG DESCRIPTION

Information technology has dramatically transformed how research across many disciplines is conducted. This is particularly true in the biological sciences where researchers frequently find themselves faced with massive amounts of diverse data to analyze. As data types and volumes continue to grow, knowledge of scripting, database management, and advanced computing skills are critical for researchers.

Topics will address a gap in how research has advanced—*and become increasingly computational*— while student training in the use of computational tools has lagged. The course will cover basic concepts that will provide the ability for students to apply new technologies to a wide array of research questions. A foundation in information management concepts opens doors for well-trained scientists and allows them to work in multidisciplinary research.

This course will survey areas where high performance computing, large-scale data access and integration, informatics tools and software, and multi-disciplinary collaboration have had high impact on research as a foundation for computationally-enabled research.

THE COURSE IS ROUGHLY DIVIDED INTO THREE SECTIONS:

SECTION 1: Linux command line, Bash scripting, version control and using high-performance computing resources

SECTION 2: Python scripting

SECTION 3: SQL database introduction and integration with Python

PRE-REQUISITES AND CO-REQUISITES

Junior or senior standing.

COURSE OBJECTIVES

By the end of the course, the student will:

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- Effectively and efficiently manipulate text files, performing complex regular expression replacements, reformatting and merging files in various ways.
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COURSE WEBSITE AND COMMUNICATIONS

Course materials and related information will be posted on the course E-Learning (Canvas) website at <http://lss.at.ufl.edu>. You are responsible for all announcements made in class and/or posted on the course website for this course.

Students are encouraged to use the course discussion board in Canvas for questions and discussion, but should not hesitate to email the instructor.

REQUIRED MATERIALS

FEES

None

TEXTBOOKS OR OTHER READINGS

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SOFTWARE AND HARDWARE

PARTICIPANTS WILL BE REQUIRED TO HAVE A PORTABLE COMPUTER WITH ABILITY TO CONNECT TO THE INTERNET IN CLASS EACH PERIOD. As access to power during course time may be limited, students should ensure their computer is charged and able to function for the 50 minute class period.

Several free/open source software packages will be used throughout the course, and students will be required to install some of these.

Students will be required to apply for a (free) Research Computing account to access HiPerGator for coursework.

Students will be required to apply for a (free) Github.com account for coursework.

FOR ISSUES WITH TECHNICAL DIFFICULTIES FOR CANVAS, PLEASE CONTACT THE UF HELP DESK AT:

- <http://helpdesk.ufl.edu>
- (352) 392-HELP (4357)

- Walk-in: HUB 132

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

COURSE OUTLINE

Week	Date	Topic
1	8/22/18 8/24/18	Introduction and course objectives. UF Research Computing Intro & getting started
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3	9/3/18 9/5/18 9/7/18	Labor Day Holiday—No Class Shell Scripts Shell Scripts, Version Control: git and GitHub
4	9/10/18 9/12/18 9/14/18	Version Control: git and GitHub Using UF Research Computing resources Running batch jobs, Compiling source code
5	9/17/18 9/19/18 9/21/18	Singularity/Docker Data Management/Data Curation Wrap-up
6	9/24/18 9/26/18 9/28/18	Introduction to Python Python data types Working in Python, Flow Control
7	10/1/18 10/3/18 10/5/18	Working in Python, Functions Working in Python: try/except, Strings, File I/O Lists, Dictionaries, Tuples
8	10/8/18 10/10/18 10/12/18	SciPy, NumPy, Pandas Independent work/in-class exercises Scripting data acquisition
9	10/15/18 10/17/18 10/19/18	Class project Matplotlib and data visualization Class project, continue
10	10/22/18 10/24/18 10/26/18	Writing functions Class project, complete Python wrap-up
11	10/29/18 10/31/18 11/2/18	Overview of databases Database design Homecoming—no class
12	11/5/18	Setting up a database

	11/7/18 11/9/18	SQLAlchemy Introduction SQLAlchemy continued
13	11/12/18 11/14/18 11/16/18	Veteran's Day Holiday—No class Setting up database with SQLAlchemy Uses of databases
14	11/19/18 11/21/18 11/23/18	Class projects begin Thanksgiving break—No class Thanksgiving break—No class
15	11/26/18 11/28/18 11/30/18	Class projects, continue Graphics Class projects, complete

GRADING

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GRADING SCALE (& GPA EQUIVALENT):

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
100-93 (4.0)	92-90 (3.67)	89-87 (3.33)	86-83 (3.0)	82-80 (2.67)	79-77 (2.33)	76-73 (2.0)	72-70 (1.67)	69-67 (1.33)	63-66 (1.0)	62-60 (0.67)	59- (0)

Note: A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. For

further information on UF's Grading Policy, see:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx#hgrades>

<http://www.isis.ufl.edu/minusgrades.html>

COURSE POLICIES:

CLASS ATTENDANCE & MAKEUP POLICY:

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

QUIZ AND ASSIGNMENT DATES/POLICIES:

Quiz and assignment dates will be announced at least one week in advance and students will have at least one week to complete the quiz or assignment. Each quiz or assignment will

clearly state if it is an individual or group assignment. Individual assignments must be the student's own work, completed without the assistance of others. **ALL QUIZZES AND ASSIGNMENTS ARE "OPEN BOOK, OPEN INTERNET"**, you may use whatever resources you desire to complete the quiz/assignment.

MAKE-UP AND LATE POLICY:

Please notify the instructor of circumstances that lead to late work or missed classes. I will generally work with you and accept late work. Without prior notification, late work will be penalized 5% per week after the due date.

STUDENTS REQUIRING ACCOMMODATIONS:

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

COURSE EVALUATION:

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>

CLASS DEMEANOR OR NETIQUETTE:

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

CELL PHONE AND TEXTING POLICY:

Students must turn cell phones to vibrate before coming to class. Each time a student's cell phone rings or each time that a student texts during class, 1% will be deducted from that student's final grade for each instance.

UNIVERSITY HONESTY POLICY:

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code

and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class

CAMPUS COUNSELING AND MENTAL HEALTH RESOURCES:

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: <https://counseling.ufl.edu/>.

HEALTH AND WELLNESS

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center:

<https://counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS):

Student Health Care Center, 392-1161.

University Police Department:

392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

UNIVERSITY OF FLORIDA

COMPUTATIONAL TOOLS FOR RESEARCH IN BIOLOGY

BSC 6###

3 Credits

Fall 2018

Room: Rogers 110

M,W,F 8:30-9:20 (2nd Period)



INSTRUCTOR:

Matt Gitzendanner

magitz@ufl.edu

Dickinson Hall room 301c

273-1960

Office Hours: Tuesdays 12:30-1:30; Fridays 9:30-10:30, or by appointment

CATALOG DESCRIPTION

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SECTION 3: SQL database introduction and integration with Python

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Junior or senior standing.

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GRADING

- QUIZZES: 5 @ 20 points each (25% of final grade)
- PROBLEM SETS: 5 @ 20 points each (25% of final grade)
- GITHUB ASSIGNMENTS: 5 @ 10 points each (25% of final grade)
- CLASS PROJECTS: 2 @ 40 points each (20% of final grade)
- CLASS PARTICIPATION: 20 points (5% of final grade)
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A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
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(4.0)	(3.67)	(3.33)	(3.0)	(2.67)	(2.33)	(2.0)	(1.67)	(1.33)	(1.0)	(0.67)	(0)

Note: A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. For further information on UF's Grading Policy, see:

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COURSE POLICIES:

CLASS ATTENDANCE & MAKEUP POLICY:

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

QUIZ AND ASSIGNMENT DATES/POLICIES:

Quiz and assignment dates will be announced at least one week in advance and students will have at least one week to complete the quiz or assignment. Each quiz or assignment will clearly state if it is an individual or group assignment. Individual assignments must be the student's own work, completed without the assistance of others. **ALL QUIZZES AND ASSIGNMENTS ARE "OPEN BOOK, OPEN INTERNET"**, you may use whatever resources you desire to complete the quiz/assignment.

MAKE-UP AND LATE POLICY:

Please notify the instructor of circumstances that lead to late work or missed classes. I will generally work with you and accept late work. Without prior notification, late work will be penalized 5% per week after the due date.

STUDENTS REQUIRING ACCOMMODATIONS:

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

COURSE EVALUATION:

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at

<https://evaluations.ufl.edu/results>

CLASS DEMEANOR OR NETIQUETTE:

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

CELL PHONE AND TEXTING POLICY:

Students must turn cell phones to vibrate before coming to class. Each time a student's cell phone rings or each time that a student texts during class, 1% will be deducted from that student's final grade for each instance.

UNIVERSITY HONESTY POLICY:

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class

COUNSELING AND MENTAL HEALTH RESOURCES:

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress related problems. "A Self Help Guide for Students" is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: <https://counseling.ufl.edu/>.

HEALTH AND WELLNESS

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center:

<https://counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS):

Student Health Care Center, 392-1161.

University Police Department:

392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

